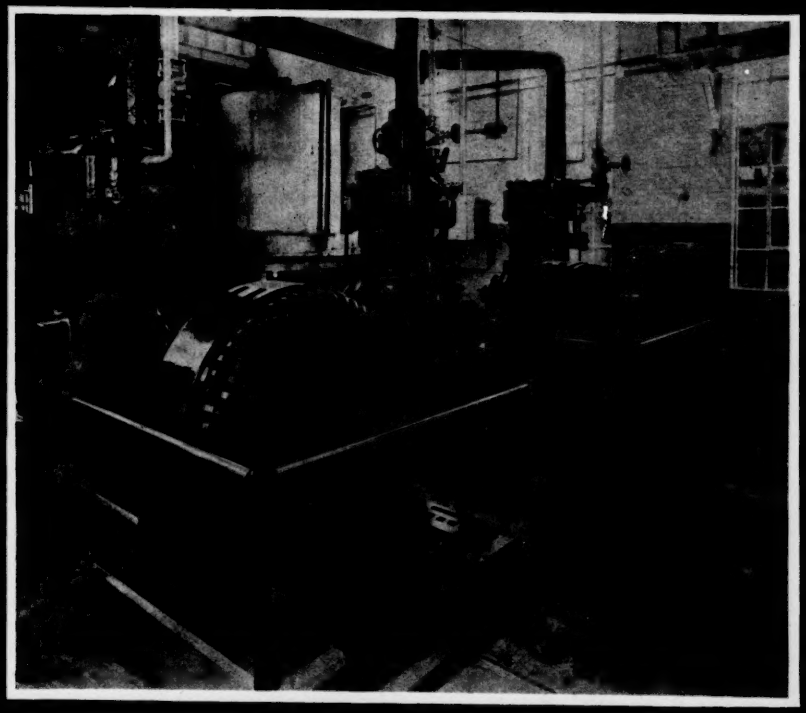
ICE and REFRIGERATION



NOVEMBER • 1951

NEW HIGHS IN EFFICIENCY... NEW LOWS IN TEMPERATURE

...when refrigerating compressors are lubricated with the New and Improved TEXACO CAPELLA OIL (Waxfree)

The new and improved *Texaco Capella Oil (Waxfree)* is ideal for all ordinary refrigerating jobs—and *no other oil equals it in ultra-low temperature service!* The name means what it says — *waxfree.* You can count on clean, efficient compressor operation . . . freedom from wax precipitation . . . even at temperatures of minus 100° F.

Tested against the leading oils on the market, *Texaco Capella Oil (Waxfree)* exceeded them all in low haze and floc temperatures. *Texaco Capella Oil (Waxfree)* is extremely pure. And its low pour test, high oxidation resistance and freedom from moisture are added factors in promoting efficiency and reducing costs.

There is a complete line of *Texaco Capella Oils (Waxfree)* to meet the operating requirements of every type and size of compressor — regardless of age of compressor or refrigerant used. They are available in *sealed* 55-gallon drums, as well as 5-gallon, 1-gallon and 1-quart cans for make-up.

Let a Texaco Lubrication Engineer help you select the proper one for your compressors. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, New York.

VISIT THE TEXACO EXHIBIT AT THE REFRIGERATION SHOW • BOOTH 211-215 ★ CHICAGO, NOVEMBER 5-8

TEXACO

TEXACO Capella Oils (Waxfree)

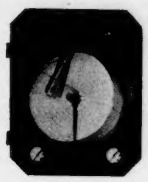
FOR ALL REFRIGERATING AND AIR CONDITIONING COMPRESSORS

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station

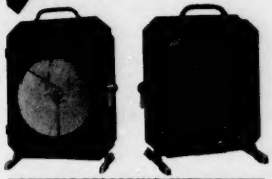
CHECK THIS PAGE

for the Taylor Instruments you need!

IF you need instruments like these for better measurement or control of any refrigeration process, call your Taylor Field Engineer! Or write Taylor Instrument Companies, Rochester, N. Y., or Toronto, Ontario. *Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.*



TAYLOR FULSCOPE CONTROLLER
For tanks, brine lines, compressors, etc. Probably the most versatile, flexible instrument made for temperature, pressure, flow and liquid level control. Easily adaptable to any operating conditions.

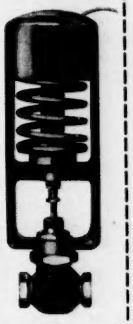


PORTABLE RECORDING THERMOMETER
For storage rooms, processing rooms, refrigerating rooms, etc. A standard Taylor Recording Thermometer to which a carrying handle and feet have been added.

TAYLOR DIAL THERMOMETER
For cold storage rooms, bunker rooms, brine tanks and other applications where periodic reference is required and a continuous record is not considered essential.

TAYLOR RECORDING THERMOMETER
For brine tanks, brine and ammonia lines, bunker rooms, or any process in refrigeration where temperature record is required. Available in one, two or three pen types.

TAYLOR SELF-ACTING CONTROLLER
For the control of apparatus where temperature of cooling medium is not lower than 10°F. Simple, easy to use, inexpensive. Reacts quickly to changes in temperatures.



TAYLOR INDUSTRIAL THERMOMETER
For installation in insulated lines. New, one-piece, shallower case for wider angle of vision. Triple lens Binoc tubing and bold, contrasting scale make this the easiest to read of all industrial thermometers.

TAYLOR'S CATALOG FOR REFRIGERATION INDUSTRY
A revised edition gives details on how these instruments, and many more, can cut costs, give new efficiency on refrigeration problems. Write today for **Catalog 300 Jr.**

Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY

THIS "Life Line" FORETELLS GOOD FORTUNE FOR YOUR PIPING

Every cost sheet today confirms the fact that the most expensive material you can use is that which must be replaced too soon . . . and too often. Premature pipe failure digs deep into your profit pocketbook—directly, through repair or replacements; indirectly, through production tie-ups and disrupted routine.

Users by the thousands have found the answer to lower maintenance in Byers Wrought Iron pipe. They have come to recognize its *red spiral stripe* as a dependable "life line" for predicting future service. They know that when corrosion is a threat to durability, Byers Wrought Iron pipe lives up to the prediction and pays-off in long, trouble-free service.

This time-tested material has rolled up impressive service records in a wide variety of applications. It is serving in thousands of snow-melting systems, of all sizes. Its mechanical strength and proved corrosion resistance make it the first choice for radiant heating systems. In steam and return lines, Byers Wrought Iron pipe has been remarkably effective in eliminating excessive repairs. It has successfully combated corrosive hazards in condenser services, air conditioning systems, underground lines, and sewage disposal plants. Many more services could be added to this list . . . but these will serve to suggest genuine wrought iron's many possibilities.

The next time you approve or specify pipe, investigate the superior performance of genuine wrought iron. You'll find it profitable to do so. For more facts on this time-tested material, write for our bulletin, THE ABC's OF WROUGHT IRON.

A. M. Byers Company, Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, San Francisco. Export Division: New York, N. Y.

WHY GENUINE WROUGHT IRON LASTS

This notch-fracture test specimen illustrates the unique fibrous structure of genuine wrought iron—which is responsible for the high corrosion resistance of the material. Tiny threads of glass-like silicate slag, distributed through the body of high-purity iron, halt and disperse corrosive attack, and discourage pitting and penetration. They also anchor the initial protective scale, which shields the underlying metal.

BYERS

CORROSION COSTS YOU MORE THAN WROUGHT IRON

WROUGHT IRON

TUBULAR AND HOT ROLLED PRODUCTS

ELECTRIC FURNACE QUALITY ALLOY AND STAINLESS STEEL PRODUCTS

Ice and Refrigeration

VOLUME 121 NUMBER 5

J. F. NICKERSON, Founder

H. T. McDERMOTT
EDITOR AND PUBLISHER

EDGAR R. CURRY
Managing Editor

EMERSON A. BRANDT
Technical Editor

HARRY D. BUSBY
Associate Editor

●

Advertising

O. R. ELOFSON
Advertising Director

EDW. DAVIESON, Chicago

D. WANAMAKER, Los Angeles

●

L. R. TOWNSLEY
General Manager

HELEN G. SMITH
Assistant Manager

●

Published Monthly By
NICKERSON & COLLINS CO.

General Offices
433 N. Waller Ave., Chicago 44, Ill.
Telephones AUstin 7-1303-04-05

LOS ANGELES: Duane Wanamaker
610 S. Broadway, Los Angeles 15, Calif.

WASHINGTON: 1706 L St., N.W.
Washington 6, D. C.

CHANGE OF ADDRESS

Notify publisher and your local post office promptly of change of mailing address to avoid non-receipt of copies. Copies incorrectly addressed, because of failure to notify publisher, cannot be replaced. Upon request, post office will provide, without cost, convenient "change of address" mailing cards.

Ice and Refrigeration, Vol. 121, No. 5. Published monthly at 433 N. Waller Ave., Chicago, Ill., U.S.A., by Nickerson & Collins Co. Yearly subscription in the U. S., $3.00 per year; other countries, $4.00. Single copies, 35 cents. Copyrighted 1951 by Nickerson & Collins Co. Entered as second-class matter August 8, 1891, Chicago, Ill., under the Act of March 3, 1879. Additional entry at Beloit, Wis.

The entire contents of this journal are covered by general copyright, and special permission must be obtained from the publishers of same before reprinting long extracts or reproducing illustrations; but editors desiring to do so are welcome to use not more than one-third of an article, providing credit is given at the beginning or end of such excerpts as follows—from "ICE AND REFRIGERATION," Chicago.

Ice and Refrigeration is indexed regularly by Engineering Index, Inc., and is microfilmed for library use by University Microfilms.

November 1951

CONTENTS

Cover: Ammonia compressors and synchronous motor drives in Railways Ice Plant, Memphis, Tenn.

Feature Articles

Eighth International Congress 13
Report of Eighth International Congress Held At London, England, Aug. 28 to Sept. 4

Low Temperature Refrigerator Cars 21
Individual cooling units now provide low temperatures for frozen foods

Energy Content of Foods 23
Specific heat and energy content of foods which must be lowered during freezing process

Safety in Industrial Refrigeration 27
Hazards in refrigerating industries are reviewed and safety program outlined

Recording Speeds Truck Loading 29
Warehouse installs voice recording and transmitting device to expedite truck unloading and loading

The Ice Industry

Big Ice Show Ready to Open in Texas 33
Corn Icing Produces Profits 35
Missouri Ice Plant Adds Service 37
Iowa Ice Company Diversified Refrigeration 39
Reports from Unit Ice Associations 41

Practical Refrigerating Engineer

Step by Step Modernization 45
News Notes and Chapter Activities 46
N.A.P.R.E. Question Box 49

Refrigerated Warehousing Industry

Great Lakes Chapter Meeting 52
Alford Expands Refrigerated Space 55
Cold Storage Holdings 57

Departments

Frozen Foods 59
Convention Calendar 62
Association Directory 62
New Plants 64
Deaths 66
What's New in Equipment 68
Manufacturers' News 70
Catalogs and bulletins 72

PLAN NOW

TO CUT POWER COST

AND BOOST TONNAGE WITH

Vogt BRINE COOLERS

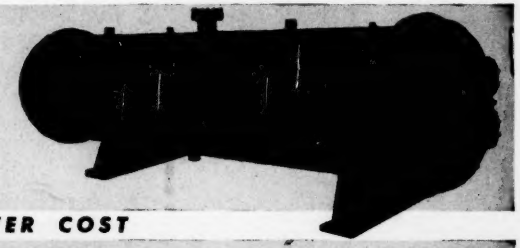
WRITE FOR COMPLETE DETAILS
ASK FOR BULLETIN BC2

DOWN GOES POWER COST AND UP GOES TONNAGE when old evaporators are replaced with modern, Vogt Brine Coolers. The reason . . . maximum evaporating surface packed into a minimum of space with correct design and sound construction the controlling factors.

Vertical Multipass type coolers can be furnished for use where floor space is limited and ample head room is available.

MULTIPASS TYPE

The cooler for closed brine systems in cold storage plants, dairies, packing plants, oil refineries, etc., requiring units of large capacity.



LOWER YOUR POWER COST

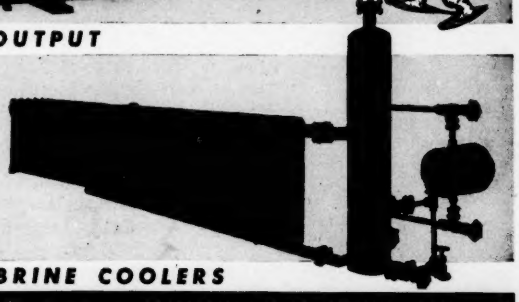
SINGLEPASS TYPE

Standard for ice freezing tanks and ideal where multiple can lifts are used. Large gas liberation area and rapid circulation of brine makes this a very efficient unit.

RAISE TONNAGE OUTPUT

COIL TYPE

Recommended for ice freezing tanks and other refrigerating purposes where space is limited. The gas is quickly liberated and a high rate of heat transfer is effected.



INSTALL MODERN VOGT BRINE COOLERS

HENRY VOGT MACHINE CO., Inc., • • • • • LOUISVILLE 10, KENTUCKY

Branch Offices: New York · Chicago · Cleveland · Philadelphia · Dallas

DRAWING OFF PLASMA from centrifuged blood. The plasma, which is in the upper part of the bottle, constitutes about 50 percent of the volume. The room in which this operation takes place is carefully air conditioned to minimize bacterial growth. Suniso Oils assure trouble-free performance of the air-conditioning equipment.

PLASMA PRODUCTION ASSURED BY SUN

Refrigeration—lots of it and never-failing—is vital in processing blood plasma. At Sharp & Dohme, world's largest producer, temperatures must be held at precise levels ranging from 40F in processing rooms to −4F for storage of the frozen plasma. To protect the costly compressors, assure continuous output and minimum organic change in the plasma, this company relies on Suniso Refrigeration Oils. Thanks to Suniso, compressor operation has been trouble-free since the very start of production.

Dependable service like this has helped make Suniso Oils first choice of equipment manufacturers. For free booklet describing all grades of Suniso Refrigeration Oils, write Department IR.11

"SHELLING" MACHINE rotates bottles of plasma in a dry-ice bath held at −94 F. Plasma freezes to the bottle walls, leaving hollow cores which speed the special dehydration process. The bottles are then stored for several hours at −4F. This is no challenge to Suniso Oils, the low-temperature grades of which operate satisfactorily below −120 F.

DRIED PLASMA, ready for shipment to hospitals and to the Armed Forces overseas, being removed from a dehydration chamber. Here a vacuum equal to an altitude of 40,000 feet removes the liquid portion from the frozen plasma. The finished product contains less than 1 percent of moisture, evidence of the efficiency of the Sun-lubricated high-vacuum pumps.

HIGH VACUUM PUMPS being tested for possible leaks by a technician. Radioactive material in a cylinder connected to the system detects the presence of acetone, which has previously been sprayed over a suspected area. Solnus Oils—"Job Proved" lubricants for this type of pump—have consistently matched the dependability of Suniso Oils in the compressors.

SUN INDUSTRIAL PRODUCTS

SUN OIL COMPANY, PHILADELPHIA 3, PA. • SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

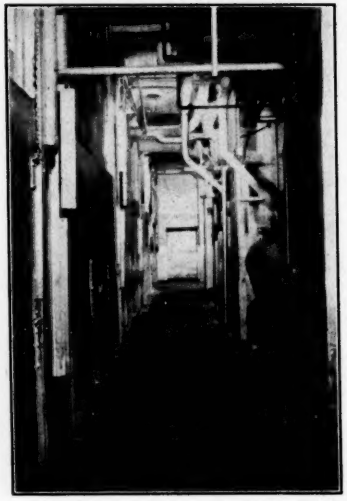
SUNOCO

Another

Community Refrigeration Center

Developed with

Frick Refrigeration



In 1927 the Carthage (Missouri) Ice & Cold Storage Company was operating a 30-ton ice tank.

Today the modernized plant makes 110 tons of ice per day; has a dozen city and country routes, ices railway cars and trucks; rents 2,800 lockers; freezes up to 200,000 pounds of eggs, poultry, strawberries, boysenberries, and packing house products daily; operates 600,000 cubic feet of freezers and coolers. The office is air conditioned.

All the cooling loads are carried by ten large Frick refrigerating machines.

Another example of a prosperous COMMUNITY REFRIGERATION CENTER developed with Frick Refrigeration. Does YOUR community have a comparable plant?

Get in touch with your nearest Frick Branch; they are in the following cities:

Some of the Ten Frick Ammonia Compressors at the Carthage Plant

Branches

Atlanta	Oklahoma City
Boston	Palatka, Fla.
Charlotte	Philadelphia
Cincinnati	Pittsburgh
Dallas	Saint Louis
Kansas City	Washington
Los Angeles	Buffalo
Memphis	Chicago
New Orleans	Seattle
New York	Portland

DEPENDABLE REFRIGERATION SINCE 1882

FRICK CO.

WAYNESBORO, PENNA. U.S.A.

"Fine food demands cleanliness so we insist on Packaged Processed Ice"

SAYS W.C. GENTRY, SAVOY GRILL, KANSAS CITY, MO.

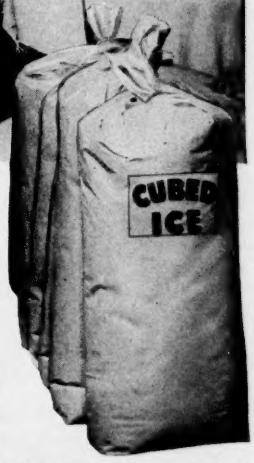
For nearly 50 years the Savoy Grill at 9th & Central, Kansas City, has been known for its live Maine lobster, fresh seafood and prime steaks.

One-Trip Paper Ice Bags Put New Life in the Ice Business

PEOPLE who sell food can't take a chance with cleanliness! That's why so many of them insist on buying their ice in Union One-Trip Paper Ice Bags that lock out all dirt and contamination.

And it's lucky for you they do! Consumers ice more often with convenient-sized, easy-to-handle Union Paper Ice Bags. They are easily carried and speed up handling on the platform, in loading and at the delivery point. And the double layer of Union wet-strength, water-repellent paper acts as an insulator to retard melting.

Hundreds of ice companies are now using Union Paper Ice Bags. Write for further information and free samples.



Wet-Strength Paper Ice Bags have tremendous strength even when soaking wet . . . thanks to a water repellent resin that binds the fibres of the paper firmly together.

ONE TRIP

UNION Paper Ice Bags

A product of the UNION BAG & PAPER CORPORATION • 233 Broadway, New York 7, N. Y.

Bags of Kraft, Transparent Films, Waxed Paper, Glassine, Laminates

pre-publication announcement of a new book on refrigeration

BASIC REFRIGERATION

PRINCIPLES • PRACTICE • OPERATION

by **GUY R. KING, Refrigeration Instructor**
Santa Monica Vocational School

WITHIN the 29 chapters of this 500-page book is contained a complete and simplified presentation of the fundamentals of refrigeration, giving equal treatment to all common refrigerants, design, operation and servicing of the apparatus and systems.

The author has drawn on a wide and varied experience in the practical aspects of refrigeration, coupled with many years of teaching the subject. BASIC REFRIGERATION is written in non-technical language and the author has recognized the requirements of the refrigeration engineer, installer, salesman, student and instructor, compiling the text in a manner which progressively treats the subject from fundamentals to complete systems.

The text is supplemented by an unusually large number of excellent illustrations, (348). All basic points are graphically illustrated in a way that creates additional interest for the reader and assists him to gain a full understanding.

Numerous example problems are given along with a step by step solution. Each chapter is followed by a good group of questions.

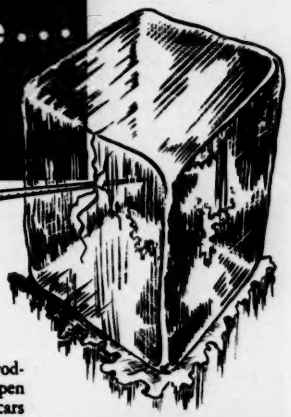
Pre-publication Price — $6.00

NICKERSON & COLLINS CO., *Publishers*

433-435 North Waller Ave. -- Chicago 44

improve your crushed ice service . . .

AND SELL MORE ICE



Open New Sources of Profit
In the Perishable Food Field

Equip your plant to offer crushed ice service to shippers of perishable products. Conveyco ice crushers, crusher-blowers and portable crusher-blowers open new opportunities for selling more ice. Top icing trucks and railroad cars loaded with produce and other perishables is profitable business. If you're not located near a truck depot or railroad siding, Conveyco's portable truck-mounted crusher-blower will permit you to offer crushed ice service at the customer's location. Vegetable markets, milk trucks, shippers of fruits and vegetables, plus many other local customers need crushed ice to protect their merchandise. Take advantage of this lucrative market now with profit-making Conveyco ice crushing and ice conveying equipment.

You can get complete information by filling in the coupon below and mailing today! Get in on these extra profits now!

Icing carloads of produce offers extra profits. Reefer trucks also present an additional market for ice.

Truck mounted Crusher-Blower icing a car.

ENGINEERS - MANUFACTURERS

THE CONVEYOR CO.

3260 EAST SLAUSON AVENUE

LOS ANGELES 58 CALIFORNIA

THE CONVEYOR CO. IR 1
3260 East Slauson Ave., Los Angeles, California

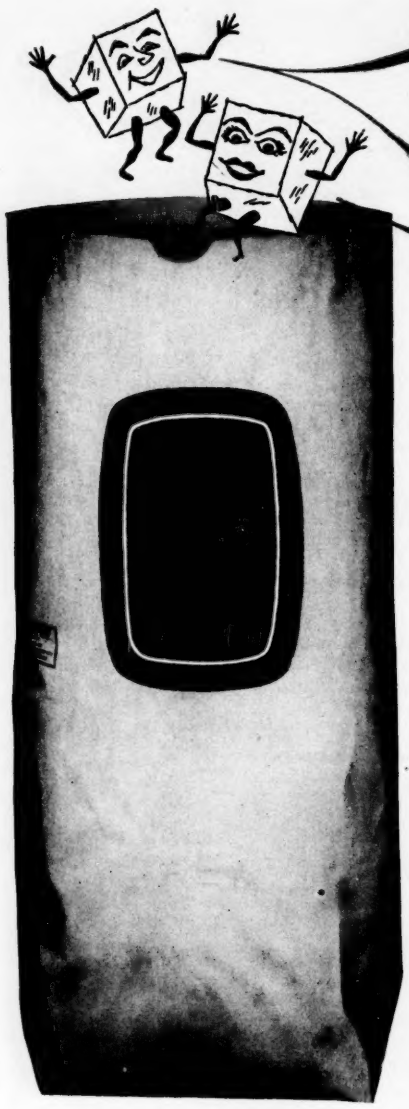
CONVEYCO

Please send complete details on Ice Crushing and Conveying Equipment.

Name_____ Title_____

Company_____ Address_____

City_____ State_____



1 out of every 2
HOMES WITH MECHANICAL REFRIGERATORS BUY EXTRA ICE*

...76% of these
WANT THEIR ICE IN WET STRENGTH BAGS*

Here's Why...

Customers choose the ice cube package that's stronger, insulated to keep ice longer and stays neat . . .

The International Hydrotuf® ice bag.

Once you use them you too will prefer International's ice bags...

The bag you use for ice cubes is part and parcel of your service. Sign it with your name and a well-printed advertising message. Make sure it's an International ice bag. International Paper Company, 220 East 42nd Street, New York 17, N. Y.

BURSTING
LEAKING
SPILLING OUT
MELTING
WASTE
DIRT

STRONG (WET OR DRY)
STURDY
SANITARY
SURFACED FOR PRINTING
LIGHT WEIGHT
EASY TO STORE

* These figures are from a survey conducted by "Ice & Refrigeration Magazine".

International Paper COMPANY
SOUTHERN KRAFT DIVISION

In The Spotlight

THE EIGHTH International Congress of Refrigeration held at London, England August 28 to September 4 attracted about 600 delegates representing 32 nations. A large number of technical papers were presented. For a running account of the Congress and pictures, see page 13.

NEW REFRIGERATOR CARS have been designed and built to provide constant low temperatures for frozen foods. Results are accomplished by use of individual cooling units. Description and pictures are given in article on page 21.

THE SPECIFIC HEAT and energy content of foods which must be removed in lowering its temperature during the freezing process, was the subject of an experimental study at the University of Texas. The study is described and results are given in the article on page 23.

SAFETY in Industrial Refrigeration was discussed by Emerson Brandt at a meeting of the Refrigeration Safety Committee of the National Safety Congress. This paper is given in full on page 27.

RECORDING and transcribing equipment has been used in a service warehouse as an aid in loading trucks. The method was described as quite successful, resulting in eliminating one man from the loading operation and producing other time-saving results. See page 29 for description of the process.

THE ANNUAL ICE convention at Houston, Tex., November 13-16 will present a program of more than passing interest, with headline speakers, a sparkling entertainment program, and business sessions covering the more important ice industry operations. Details are given in the story starting on page 33.

COVER PICTURE: Three of the four ammonia compressors and their synchronous motor drive in Railways Ice Co. plant, Memphis, Tenn. They are the principal units in a modernization program which converted operation to automatic control and aided efficiency with a resulting cut in production cost. See page 45 for story.

ICING SWEET CORN has been proven profitable to grower and distributor as well as providing a better quality for the consumer. Additional information on this subject is provided by tests conducted in Ohio and reviewed in article on page 35.

THE CARTHAGE Ice & Cold Storage Company has established a community refrigeration center at Carthage, Mo. with diversified refrigeration service. The plant and business is described in article on page 37.

THE HUBBARD Ice & Fuel Co., Cedar Rapids, Iowa, was featured in a local newspaper story, telling about its growth and business development. See page 39.

SCARCITY OF pipe and other materials have made it advisable for many plants to adopt a step-by-step modernization program that will reduce interruption in operation. Suggested procedure is given in article on page 45.

THE GREAT LAKES Chapter National Association of Refrigerated Warehouses held a meeting at the Edgewater Beach Hotel, October 12. For report of meeting see page 52.

ALFORD Refrigerated Warehouses at Dallas, Tex. is expanding to meet increased demand for freezer storage space, eighteen months after the big storage center was completed. For details see article on page 55.

60 Years Ago

From the November, 1891 Issue of ICE AND REFRIGERATION

THE ICE-MAKING establishment of the Diamond Ice Co., Wilmington, Del. was in many respects deserving of special notice and comment. In an illustrated descriptive article the remarkable clearness and purity of the ice is shown by portraits of Messrs. E. T. Warner and A. L. Dorr, owners, through a 14-inch block of ice. This plant used the plate system of ice manufacture, one of the earliest methods in America.

"THERE IS no cold storage warehouse in Texas where the figs and peaches and tomatoes and the deadly watermelon and the spicy cantaloupe can be preserved in abundance. It is too much like flying in the face of Providence who has filled the seasons, thus to disturb the regular order of things for the gratification of the appetite. At the same time such a warehouse would be a source of profit to the stockholders even if they had to buy the products of the farmers' gardens and orchards when they were cheap, and sell them at a higher price in the winter and early spring."

The mis-statement of fact and questionable morals in the above quotation from the San Antonio Express was pointed out by the editor of ICE AND REFRIGERATION who admitted that nature had provided for the gratification of the human appetite but expressed the thought that the burden of the preservation of her gifts and their judicious use had been passed on to man, the beneficiary.

A LAWSUIT filed in Memphis, Tenn. brought out the story of Frank A. Smith and his "refrigerine salts" which he claimed would produce cold without ice. Smith interested W. B. Chapin, a New York broker, and the two went to London and organized the Eureka Refrigerating Co. The British public fell for it and invested some 13,000 pounds in stock of the company. After collecting his share of the proceeds, Smith returned to America. Scientists then began looking into the scheme and denounced it as a fallacy. Chapin had to reimburse the angry British stockholders. He followed Smith to America and sued him. But the court ruled that Chapin knew what kind of business Smith was in and on that ground held there was no fraud and ordered the jury to find for the defense.

...is one way to bigger profits

Expensive "muscle power" in an ice plant is a continuous drain on profits as well as a man's constitution. It needn't be. Because a G-W slat conveyor is a big labor saver... moves bagged and cake ice around the plant or to delivery platforms in less time and with fewer broken cakes. That adds up to lower over-head—more sales—bigger profits.

G-W conveyors are designed to carry block or processed ice in bags on straight, curved or right angle sections, from room to room or the outside platform. Unlimited flexibility assures an arrangement to fit perfectly your plant layout.

A Gifford-Wood engineer will be glad to visit your plant upon request. He is ready to apply 135 years of ice handling experience to any problem you may have without obligation. Call him in—let him show you the G-W way to bigger profits.

GIFFORD-WOOD CO.

Since 1814

Hudson, New York

420 LEXINGTON AVE. NEW YORK 17 | RAILWAY EXCHANGE BLDG. ST. LOUIS 1, MO. | 565 W. WASHINGTON ST. CHICAGO 6

Pacific Coast Representative:
WESTERN ICE EQUIPMENT COMPANY, 420 Market St., San Francisco 11, Calif.

6772

When You Think of Materials Handling, Think of GIFFORD-WOOD

EIGHTH INTERNATIONAL CONGRESS

Report of Eight International Congress of Refrigeration held at London, England, August 28 to September 4. Technical papers presented by representatives of many countries.

THE Eighth International Congress of Refrigeration was held in Church House (Dean's Yard) in London, England from August 28 to September 4 with visits extending through September 10, 1951.

"Church House has its origin in the Jubilee Year of Queen Victoria. A group of far-sighted Churchmen launched the idea that the Church's commemoration of that event should take the form of a worthy meeting place for the many activities of the Church. A Royal Charter was granted to the body then, as now, known as the Corporation of the Church House. At the end of 1932, when the outstanding leases of the original property had fallen in, further developments became possible, and it was decided to clear the whole site and reconstruct the building to suit modern needs. The foundation stone of the main building was laid by H. M. Queen Mary on 26 June, 1937. By the end of the year the foundations and steel work were completed, but the outbreak of the war delayed the completion of the superstructure. On October 14, 1940, Church House received a direct hit in an air raid. Repair work was started in October, 1946 and the blast walls and other wartime scars were gradually removed."

A total of about 600 were registered for the Congress. Thirty-two nations were represented by those in attendance. Those attending from North America were: Mr. and Mrs. Paul B. Christensen and daughter, Dr. L. I. Dana, T. M. Elving, Dr. H. L. Garver, Dr. and Mrs. M. A. Joslyn, Mr. and Mrs. M. T. Pentzer, G. T. Skaperdas, Prof. Karl Kayan and Professor Byron E. Short, all from U.S.A.; and Dr. W. H. Cook and Dr. O. C. Young from Canada.

Enrollment of those attending the Congress was begun at 2:00 p.m. Tuesday, August 28. This procedure was continued until 3:00 p.m. Wednesday, August 29 when the opening ceremony was held.

Opening Ceremony

About 350 were present at the opening ceremony which was held in the beautiful Assembly Hall in Church House. The Right Hon. Viscount Bruce of Melbourne, P.C., C.H., M.C., F.R.S., president of the Congress, presided at this session. With him on the platform were Viscount Alexander of Hillsborough, P.C., C.H., Ll.D. (Chancellor of the Duchy of Lancaster), Lord Cherwell, P.C., F.R.S. (technical advisor to Mr. Churchill during the War), Mr. Charles David (France) (director of the International Institute of Refrigeration), Mr. J. Foulon (Belgium) (representing Professor W. J. de Haas, co-president of the Congress with Viscount Bruce), Dr. Ezer Griffiths, O.B.E., F.R.S. (president of the Technical Council and elected president of the International Institute of Refrigeration at end of Congress), and Mr. W. S. Douglas (chairman of the Organizing Committee.)

Photo Courtesy Ministry of Foods

Viscount Bruce, P.C., C.H., M.C., F.R.S., president of the Institute of Refrigeration, addresses opening session. Left to right: W. S. Douglas (Chairman of the Organizing Committee), Lord Cherwell, P.C., F.R.S., Viscount Alexander of Hillsborough, P.C., C.H., LL.D. (Chancellor of the Duchy of Lancaster), Viscount Bruce, Monsieur J. Foulon, Dr. Ezer Griffiths, O.B.E., F.R.S., and Monsieur Charles David (President of the International Institute of Refrigeration).

Photo Courtesy Ministry of Foods

Official opening of Eighth International Congress of Refrigeration at Church House, Westminster, London. Picture shows delegates listening to Monsieur J. Foulon

Group photograph of delegates and representatives of Eighth International Congress of

Viscount Bruce opened the Congress by reading a message of greetings from King George VI of England. Viscount Alexander made the opening general address and stressed the value of refrigeration and the need for international cooperation in refrigeration as well as in all things.

Mr. J. Foulon read a message from Professor W. J. de Haas who expressed his regrets for being unable to attend the Congress.

Chairman Bruce called attention to the details of the Congress program and then asked for comments from representatives of each of the continents. Dr. A. M. Rizk (Egypt) responded for Africa, Mr. M. L. Khanna (India) responded for Asia, Mr. J. R. Vickery responded for Australia, and Mr. R. Thevenot (France) responded for Europe and read a message from Dr. H. Queuille (president de l'Association Francaise du Froid).

Mr. Paul Christensen (president ASRE) responded for America.

Following the opening ceremony, the entire group assembled in front of Church House for a group picture.

His Majesty's (King George VI) Government held a reception in the Lancaster House from 6:00 to 8:00 p.m. Wednesday, August 29. Mr. F. T. Willey, parliamentary secretary to the Ministry of Food received the guests.

Congress Banquet

The Congress banquet was held in the Connaught Rooms Tuesday evening, September 4.

Technical Sessions

Technical sessions were held by the seven Commissions from Thursday morning, August 30 until the following Tuesday afternoon, September 4. A great variety of papers were presented, brief summaries of a number of which follow:

Abstracts of Papers

The Nutritive Value of Frozen Foods by L. W. Mapson and M. Olliver. Studies on the nutritive value of plant and animal foods preserved by deep-freezing or cold storage are reviewed. Workers in this field have been mainly concerned with losses in vitamin content, especially vitamin C, and only limited data are available for other nutrients. The principal changes in nutritive value appear to occur during (1) pretreatment of the raw material, (2) low temperature storage, and (3) thawing and final cooking. Vegetables are especially subject to loss during pretreatment, as blanching may leach out water-soluble constituents. Procedures for minimizing these losses are discussed. Although the loss of nutrients during actual freezing appears to be small, changes may occur during subsequent storage and thawing. Measures which have been suggested to minimize these changes include temperature control and the use of antioxidants. The final cooking of the frozen food results, in many cases, in a greater loss of nutrients than that occurring during processing and storage.

Changes in the Nutritive Value of Fruits and Vegetables During Chilled and Frozen Storage by W. T. Pentzer. Fruits and vegetables are important nutritionally for they are the best sources of vitamins C and A and provide 93 and 68 percent respectively of these vitamins in the food consumed in the United States. Citrus fruits, tomatoes, and the green leafy vegetables are the best sources of ascorbic acid. It is well retained in storage in oranges, grapefruit, lemons, tomatoes and other acid fruits such as berries. No losses occur in orange concentrate during frozen storage at 14 F or -10 C, and canned orange and tomato juice retain ascorbic acid well even at room temperature. Leafy green vegetables in contrast may lose 30 to 40 percent in two or three days if not well refrigerated. When frozen and stored at zero they lose very little ascorbic acid.

The best sources of provitamin A or carotene are the green or yellow vegetables and yellow fruits. Leafy vegetables may lose some carotene if not well refrigerated but do not when frozen and held at zero or lower temperatures. Carrots and sweet potatoes, both rich in carotene, may show an increase during storage. Dried apricots retained 90 percent of their carotene for a year when stored at 32 F.

Changes Occurring in Frozen Fruits and Vegetables by R. Heiss. A summary is given of the changes occurring in freezing of the more important kinds of fruits and vegetables. The storage of fruit, vegetables and fruit juice concentrates is also considered with special reference to flavor, turgescence, color and vitamin C content. The changes occurring on freezing and thawing are of greater importance than those occurring during storage at -18 C. The possibility of influencing these changes by varying the rate of freezing, the concentration of the sugar solution and the rate at which equilibrium is reached between fruit and sugar solution, etc., is generally comparatively small. Only in vegetables is it possible by choosing the correct blanching conditions to reduce appreciably changes in quality. Conditions of growth and choice of variety have a greater influence on the quality of frozen fruit and vegetables than technical factors.

The Preservation of White Fish at Sea by G. A. Reay. Recent investigations show that the quality of fish caught in Arctic waters, on voyages of several weeks, could be significantly raised by avoiding delay in stowing the fish below, by more appropriate distribution of ice in relation to heat transfer characteristics of the hold, and by shallower stowage on shelves or in boxes. With more complete thermal data on "icing code" will be produced for typical insulated and uninsulated holds under various external conditions. In these studies a newly devised points scheme for organoleptic assessment of quality has been successfully used by a test panel.

Freezing at sea appears at present to be the only method likely to improve the productivity of vessels fishing distant waters, and at the same time to secure the whole catch in fresh condition. Novel space, fuel and labor-saving freezing plant suit-

Refrigeration. Picture taken following opening ceremony in front of Church House, London

able for use on a trawler is being tested. The most promising design, a direct expansion contact freezer with movable vertical plates, is capable of quick-freezing blocks of fish five inches thick at normal evaporating temperatures.

Some Means of Retaining Quality in Fresh and Frozen Fish by O. C. Young — In recent years there has been a steady decline in the demand for fish preserved by the older methods such as by salting, drying and smoking, and there has been a corresponding increase in demand for fish that have retained more of their natural characteristics. Research, therefore, is being directed to those problems involved in retaining quality through chilling and freezing fish.

Much progress has been made toward a better understanding of quality. Better "housekeeping" techniques are being followed on vessels and shore; more effective uses of ice have been worked out; satisfactory freezing methods have been developed; storage conditions have been improved; and transport facilities are receiving much attention. Nevertheless, much of the frozen fish reaching the consumer has low appeal, which can be attributed mainly to the low quality of the product entering the freezer. Freezing at sea is suggested as a means of maintaining quality.

The Concentration of Valatile Organic Compounds in Gas Stores Containing Apples and Pears, and Methods for Removing Them by J. C. Fidler—The concentration of ethylene in commercial and experimental gas stores containing apples and pears is high. The lowest mean value recorded is 50 parts of ethylene per million parts of the gas mixture; the highest is 600 parts. Although ethylene is known to accelerate the ripening of many fruits, including apples, in air, these high concentrations do not appear to affect the storage life of gas-stored apples. No noticeable improvement in the color or hardness of the fruit was found when the concentration of ethylene was reduced to 10 ppm (or less). Ethylene has been removed by filters of brominated activated carbon, and by the addition of ozone, and (less successfully) by adding chlorine. The non-ethylenic volatiles (the "odorous" fraction) are normally present in a concentration of 5, or less, parts per million. Reduction to less than 1 ppm had no significant effect on the incidence of superficial scald of apples.

The Use of Refrigeration Equipment of a Process of Descaling by Ultra-Sonic Waves by Godard, Rousel and Vidal—We have experimented with a new process of descaling which appears to be simpler in operation than other processes, in our cold stores at Lyons and Valence. We have used as generators of ultra-sonic waves, magnetic striction generators, which are permanently set to produce very short ultra-sonic impulses. The frequency of the ultra-sonic waves produced is about 25 kilocycles.

The ultra-sonic waves prevent the formation of scale, and dislodge existing deposits by producing very intense increases and reduction of pressure succeeding each other at the proper frequency. The results obtained to date in our plants are very encouraging. Compressor water jackets and the tubes of horizontal ammonia condensers have been descaled, the scale appearing in the lower portions in the form of mud. The process cannot be applied in its present form to vertical condensers. Experiments are in progress in defrosting by ultra-sonic waves.

Investigations on the Avoidance of Dehydration Losses During the Storage of Frozen Fruit and Vegetables by Rudolf Heiss—In the course of storage tests with different kinds of packages, we found that with frozen green beans moisture losses inside the package were considerably higher than the losses caused by moisture diffusion through the package.

By tests with hermetically-sealed containers we proved that "exterior" and "interior" causes for freezer burn must be distinguished. We also found that dehydration of stored goods caused by sublimation of ice on the interior sides of the package, and by recrystallization respectively, is decisive for physical changes of the goods during storage, a fact which up to now has mostly been overlooked. Taking into consideration morphologic differences between the most important fruit and vegetable varieties, conclusions were derived from the research results of the practice of freezing.

The titles and authors of the papers presented by each of the Commissions were as follows.

Commission I

Session I: Design of Hydrogen and Helium Liquefiers

1. "A Liquefier of the Simon Type" R. Hilsch (Germany)
2. "A Liquefier for Impure Hydrogen" K. Clusius (Switzerland)
3. "A Large Expansion Helium Liquefier" Croft (Great Britain)
4. "Experiments concerning a New Type of Expansion Engine for Very Low Temperatures" E. A. Long and F. E. Simon (Great Britain)
5. "Liquid Helium Techniques" A. Wexler and W. S. Corak (U. S. A.)

Session II: Industrial Gas Separation

6. "Recent Improvements in Methods for Separating Air by Liquefaction" M. Dupaty (France)
7. "The Production and Use of Liquid Methane" A. C. Egerton and G. G. Haselden (Great Britain)
8. "Design of Low Temperature Plant" P. Borchardt (Germany)
9. "Modern Low Temperature Technique in Ethylene Recovery" G. T. Skaperdas (U. S. A.)
10. "Recent Developments in the Designs of Low Temperature Plants" P. M. Schuftan (Great Britain)
11. "The Separation of Ethylene by Liquefaction" (Guillaumeron (France)
12. "A New Sulphur Dioxide Recovery Plant at Leverkusen" H. Schnell (Germany)
13. "The Fractional Condensation of Mixtures of Oxygen and Nitrogen and Its Use in the Separation of Air with a Simple Column" F. Rivoira and L. Bassinana (Italy)

Session III: Heat Transfer; Technical Problems in Refrigeration and Low Temperature Plant

14. "Automatic Control of a Low Temperature Gas Separation Plant" M. Ruhemann (Great Britain)
15. "Heat Transfer in Exchangers" H. Hausen (Germany)
16. "Some Problems in the Calculations of Low Temperature Heat Exchangers" F. Rivoira (Italy)
17. "Enthalpy Transfer in a Cross-flow Cooling Tower" N. W. Snyder and J. E. Mahlmeister (U. S. A.)

Two views of annual banquet Eighth International Congress of Refrigeration, which was

18. "Heat Transfer from Vapors Condensing inside a Horizontal Tube" T. Schmidt (Germany)
19. "Heat Transfer with Boiling Liquified Gases" L. Weil (France)
19A. "Thermal Conductivities of Some Condensed Gases" R. W. Powers, H. L. Johnston and R. W. Mattox (U. S. A.)
20. "Thermodynamic Charts prepared at Leiden" W. H. Keesom (Holland)
21. "The Preparation of Thermodynamic Charts by the Mechanical Engineering Research Board" J. S. Bateman, J. A. W. Huggill and E. J. LeFevre (Great Britain)
22. "The Influence of Inert Gases at High Pressure on the Condensation of Carbon Dioxide" T. J. Webster (Great Britain)
23. "Absolute Temperature of the Ice Point by Isotherm Method and Its Best Value" Jiro Iishi (Japan)
24. "Contribution to the Thermodynamics of Liquefying Air" H. Glaser (Germany)

Session IV: Report on Oxford Low Temperature Conference

Commission II

Session I: Insulation and Allied Subjects

1. "Progress in the Field of Insulation" E. Griffiths and M. J. Hickman (Great Britain)
2. "Thermal Insulation in Low Temperature Technology" A. M. Clark (Great Britain)
3. "Moisture Penetration into Insulation" G. G. Lilley (Great Britain)
4. "General Dynamic Method for Determining Thermal Conductivity" L. Mattarolo (Italy)
5. "On the Analytical Form of the Coefficient of Thermal Conductivity" A. Sellerio (Italy)
6. "Measurements of the Thermal Conductivity of Some Australian Porous and Fibrous Materials" A. J. Stoney and G. R. M. Grant (Australia)
7. "Heat Transfer by Natural Convection in Refrigerated Liquids" A. J. Ede (Great Britain)
8. "Technical Refrigerating Aspect of Soil Freezing Work for Crossing by Tunnel the Deep Bed of Algone Torrent" B. Bonfioli and dell'Orto (Italy)

Session II, joint session with Comismission I.

Session III, joint session with Commission I.

Session IV: Physical - Technical Measurements and Instrumentation

9. "Flow of Boiling Liquids through Orifices and Nozzles" E. Schmidt and O. Linne (Germany)
10. "Flow of Boiling Liquid Refrigerants through Throttling Devices" K. Linge (Germany)
11. "Surface Tension of Refrigerants and Their Mixture with Oils" P. Laine and R. Mock (France)
12. "Electrical Conductivity of Methyl Chloride-traces of Hydrochloric Acid" P. Laine and R. Mock
13. "Equilibrium between Methyl Chloride, Freon-12 and Refrigerated Oils" A. Mock (France)
14. "Determination of Cooling Output by Measuring the Condensed Water and Frost Deposit" M. Backstrom (Sweden)
15. "Installations for Maintaining Constant Temperature and Humidity" P. Laine and A. Gac (France)
16. "Method of Estimating Water Vapor and CO_2 in the Atmosphere" P. Laine (France)
17. "Condensation Hygrometer permitting of the Determination to 0.1 deg C approximately of Dew Points down to –20 deg C" P. Laine (France)
18. "Apparatus for a Calibration of Hygrometers" P. Laine and A. Gac (France)
19. "Hot Wire Anemometer and Thermocouple which can be used in a Region of Variable Temperature" P. Laine (France)
20. "Investigation of a New Dew Point Hygrometer" L. Prins (Germany)
21. "Recovery of Alcohol and Carbon Dioxide by Refrigeration of Grapes" Negre and M. Marichal (France)
22. "Measures of the Viscosity of Non-congealing Liquids" A. Rasi (Italy)
23. "The Relation between Filling, Volume, Temperature and Pressure of Containers for Compressed Gases" M. Bäckstrom (Sweden)
24. "The Change in Energy Content of Foods in the Freezing Region" H. E. Staph and B. E. Short (U.S.A.)

Commission III

Session I: Some Effects of Low Temperatures on Biological Systems, Part I

1. "Suspension of Life at the Limits of Absolute Zero" P. Becquerel (France)
2. "Some Effects of Refrigeration on the Phloem Cells of Cichorium intybus" M. L. Geneves (France)
3. "Low Temperature Injury and Frost Resistance of Plant Tissues, with special reference to Fruit Trees" Irena Modlibowska (Great Britain)
4. "Tissue Culture Methods Applied to Studies of Survival of Animal Cells at Low Temperatures" L. Bucciante (Italy)
5. "Survival of Embryonic Chicken Cells at –50 deg C" G. Pierangeli (Italy)

Session II: Some Effects of Low Temperature on Biological Systems, Part II

6. "Development and Advances in Cryology" H. Leichter (Germany)
7. "Non-freezing Injury to Plant Tissues caused by Exposure to Low Temperatures" W. H. Smith (Great Britain)
8. "The Action of Enzymes in Concentrated Solution and in the Dried State" M. A. Joslyn (U.S.A.)
9. "Enzyme Activity in Frozen Plant Tissue" F. Kiermeier (Germany)

Session III: Freezing of Meat and the Biochemistry and Biophysics of "Drip from Frozen Meat"

10. "A Review and Discussion of the Problem of 'Drip' Formation in Meat and Fish" W. A. Empey and A. Howard (Australia)
11. "The Biochemistry of Muscular Tissue in relation to the Loss of 'Drip' during Freezing" J. R. Bendall (Great Britain) and B. B. Marsh (New Zealand)
12. "Defrosting of Frozen Whalemeat" K. Tanaka and T. Tanaka (Japan)
13. "The Mechanism of Freezing in Food Products" W. H. Cook and C. V. Lusena (Canada)

Held Tuesday evening September 4 in Connaught Rooms, Church House, London, England.

14. "The True Histological Structure of Frozen and Thawed Meat" G. Penso (Italy)

Session IV: Change in the Nutritive Value of Foodstuffs during Chilled and Frozen Storage

15. "The Nutritive Value of Frozen Foods" L. W. Mapson and M. Olliver (Great Britain)

16. "Changes in the Nutritive Value of Fruits and Vegetables during Chilled and Frozen Storage" W. T. Pentzer (U.S.A.)

17. "Changes Occurring in Frozen Fruits and Vegetables" R. Heiss (Germany)

18. "Stability of Vitamin C in Frozen Lemon Juice" L. Antoniani, L. Federico and T. Valle (Italy)

Session V: The Preservation of Fish by Chilling and Freezing and the Storage and Transport of the Products

19. "The Preservation of White Fish at Sea" G. A. Reay (Great Britain)

20. "Results of Methods of Testing the Keeping Quality of Chilled Fillets of Cod and Attempts to Systematize Organoleptic Testing Methods" F. Bramanaes (Denmark)

21. "Some Means of Retaining Quality in Fresh and Frozen Fish" O. Young (Canada)

22. "Experiments on the Freezing of Some Dutch Fishery Products" C. J. H. van den Broek (Holland)

23. "Use of Ethyl Gallate as an Antioxidant in the Freezing of Eels" (Paper read in title and summary only) C. J. H. van den Broek and F. D. Tollenaar (Holland)

24. "Contact Freezing of Fish Fillets between Parallel Plates" A. Watzinger (Norway)

Session VI: The Refrigerated Gas Storage of Horticultural Produce

25. "The History of Refrigerated Gas Storage for Apples and Pears and other Horticultural Produce" C. West (Great Britain)

26. "The Gas Storage of Fruit in the Netherlands" T. van Hiele (Holland)

27. "The Gas Storage of Apples and Pears in Australia" J. R. Vickery, F. E. Huelin, E. G. Hall and G. B. Tindale (Australia)

28. "Gas Storage of Apples in Denmark" P. Molls Rasmussen (Denmark)

29. "The Gas Storage of Chestnuts and of Strawberries" R. Ulrich (France)

30. "Gas Storage of Cut Flowers" J. H. M. van Stuivenberg (Holland)

31. "The Concentration of Volatile Organic Compounds in Gas Stores containing Apples and Pears and Methods for Removing Them" J. C. Fidler (Great Britain)

Commission VI

Session I: Test Codes, Safety Codes, Standardization

1. "Mechanical Refrigeration Safety Codes" H. Randal Steward (Great Britain)

2. "A.S.R.E. Safety Code and Marine Practice Code" Glenn Muffly (U.S.A.)

3. "A.S.R.E. Test Codes for Small Plants" Glenn Muffly (U.S.A.)

4. "The use of the Watt as Unit of Refrigeration Capacity" C. Codegone (Italy)

Session II: Evaporators, Flow Control

5. "The Efficiency of Cooling Surfaces with Partial By-passing" H. Glaser (Germany)

6. "A New Method for Controlling Refrigerating Machines with Capillary Tube Regulation" O. Linne (Germany)

7. "Device to Speed Circulation of Aqueous Solutions in Household Absorption Refrigerators" U. Sellerio (Italy)

8. "The Defrosting of Evaporator Coils" A. K. Alcock (Great Britain)

9. "Study of the Refrigerating Method using a Capillary Tube" T. Naganuma (Japan)

Session III: Compressors and Condensers

10. "The Influence of Speed on the Volumetric Efficiency of Reciprocating Refrigerant Compressors" G. Lorentzen (Norway)

11. "Some Aspects of the Problem of Reciprocating Compressor Design" W. R. Sinclair and C. E. Wade (Great Britain)

12. "Investigation of Economic Water Consumption in Ammonia Condensers" M. Merville (France)

13. "The Use in Refrigerating Equipment of a Process of Descaling by Ultrasonic Waves" Godard, Roussel and Vidal (France)

14. "A New Design Oil Hydraulic Refrigerating Plant for Fishing Vessels" H. Klotz (Germany)

14A. "Refrigerating Nomograms" B. Christensen (Denmark)

Session IV: Refrigerany Circles, Complete Plants

15. "For a General Definition of the Efficiency of Refrigerating Proccesses" P. Grassman (Switzerland)

16. "Natural Heat for Refrigerating Installations" B. del Nunzio (Italy)

17. "Multi-stage Refrigeration Cycles applied to the Heat Pump" A. Rasi (Italy)

18. "Unit Type Freeze-Drying Equipment" A. O'B. Brandon (Great Britain)

19. "Quick-freezing Tunnels" P. Clement (France)

Commission V

Session I: Dairy Produce; Quick Freezing; Infestation

1. "The Refrigeration of Milk on the Farm" H. S. Hall (Great Britain)

1A. "Developments in the Application of Refrigeration in the Dairy Industry" J. G. Davis (Great Britain)

2. "Contributions to the Study of the Behavior of Pasteurized Butter, stored at Low Temperatures" H. Jarousse, R. Veisseyre, G. Faurot de Lamothe and C. Salies (France)

3. "Use of the 'Catalase Index' as a Measure of the Suitability of Butter for Storage" Fayansoff and Vidal (France)

4. "Oiling and Cold Storage of English Eggs" N. E. Holmes and J. Brooks (Great Britain)

5. "Experiments on Avoiding Losses due to Drying-out of Quick-frozen Fruits and Vegetables" R.Heiss (Germany)

6. "Freezing of Boned, Packaged Meat" G. Guillot (France)

7. "Problems of Thawing of Quick-frozen Produce" B. del Nunzio and G. Troilo (Italy)

8. "Behavior of Pectin during Storage of Frozen Fruits" J. J. Doesburg (Holland)

9. "Fumigation with Carbon Dioxide and with Methyl Bromide for Control of Rodents in Fruit Stores" J. E. Boeke (Holland)

9A."Problems in the Use of Refrigeration in the Refining of Cheeses" J. Keilling (France)

Session II: Horticultural Produce; Oenology

10. "Cold Storage of Swedish Fruit" L. Rasmusson (Sweden)

10A. "Influence of Maturity of Fruits at Harvesting on their Behavior in Storage" R. Ulrich (France)

11. "Influence of Relative Humidity on the Behavior of Apples and Pears in Storage" A. Gac (France)

12. "Rapid Pre-cooling of Perishable Produce in a Saturated Atmosphere" L. Fontanel (France)

13. "Refrigeration Techniques in French Packing Stations and Cold Stores for Fruit" R. Thevenot (France)

14. "Use of Low Temperatures for Storage of Seed Potatoes" Galland, Chapuis and Geffroy (France)

15. "Influence of Temperature on the Flowering Qualities of Bulbs" J. A. Stonebanks (Great Britain)

16. "Applications of Refrigeration in the Wine-making Industries" A. Stradelli (Italy)

17. "Stabilizing and Concentrating Wine by Refrigeration" R. de Seze (France)

Session III: Construction and Design of Cold Stores; Ice-making

18. "Recent Advances in Refrigeration and Handling Equipment of Large Commercial Cold Stores and Locker Storage Plants in America" W. R. Woolrich (U.S.A.)

19. "Design of a Typical Cold Store" P. Clement (France)

20. "Some Cold Storage Practices in Canada, with particular reference to Jacketed Holding Rooms" O. Young (Canada)

21. "Distribution of Brine Speed in an Ice-making Tank" I. Kimura (Japan)

22. "United States Methods and Machines for Making Small Ice" Crosby Field (U.S.A.)

Commission VIa

Session I

1. "Comparison between Direct and Indirect Cooling for Freon-12 Cargo Refrigeration Plants" Ivar Brandin (Sweden)

2. "Avoiding Moisture Trouble on Marine Refrigerating Plant" P. B. H. Brown (Great Britain)

3. "Defrosting Processes with Dry Surface Air Coolers" J. D. Farmer (Great Britain)

4. "Heat Transmission through Ship's Insulation" (the late A. J. Smith, with comments by F. H. Schofield) presented by K. C. Hales (Great Britain)

Session II

5. "The Sea Transport of Pears and Apples from Australia and New Zealand" W. M. Carne and J. C. Walsh (Australia)

5A. "Transport Bananas from West Africa to the Mediterranean" F. Dombre (France) presented by L. Fontanel

6. "Some Biological Aspects of the Overseas Storage of Tropical Fruits" E. R. Leonard (Great Britain)

7. "The Overseas Transport of Chilled and Frozen Meat" J. R. Vickery, N. E. Holmes and K. C. Hales (Australia and Great Britain)

Commission VIb

Session I

1. "Summary of the Problems regarding the Transport of Perishable Foodstuffs by Railway Cars, Trailers and Motor Vans" D. Palmieri (Italy)

2. "Mobile Split Absorption System of Refrigeration" H. C. Hopp (U.S.A.)

3. "A Solid Absorption Machine for Refrigerated Railway Vehicles" H. I. Andrews (Great Britain)

4. "Experimental Tests on the Transport of Fruits and Vegetables in Refrigerated Cars with and without Mechanical Ventilation and in Heavily Insulated Cars on the Italian State Railway" D. Palmieri (Italy)

5. "Refrigerator Cars and their Use in the United States" W. T. Pentzer (U.S.A.)

Session II

6. "Handling of Perishable Traffic on Canadian Railways" W. H. Cook, M. W. Thistle and O. C. Young (Canada)

7. "Comparative Study of the Various Refrigerants as a Source of Cold for the purpose of Deducing their Field for Practical Use" M. Chevallier (France)

8. "Consideration of the Different Types of Transport of Perishable Foodstuffs by Railways and Recommendations for their Standardization in Europe" D. Palmieri (Italy)

9. "Comparison of the Different Types of Refrigerated Cars of Recent Construction with a view to Determining the Best Types for Standardization" E. Schroder (Germany)

10. "Conditions to be drawn up for Preparation before Forwarding of Perishable Traffic for Conveyance at Low Temperature by Wagon Container on Road Vehicle" J. B. Verlot and H. Malatier (Switzerland)

Session III: joint with Commissions III and V

Session IV

11. "Use of Insulated and Refrigerated Containers for the Transport of Perishable Foodstuffs by Rail, by Land and by Water" T. A. Eames (Great Britain)

12. "The Calculation of Refrigerator Car Performance" E. W. Hicks and J. R. Vickery (Australia)

13. "Two Practical Methods of Measuring the Coefficient of Heat Transmission of Refrigerated Rail Cars" D. Palmieri (Italy)

14. "Conditions to be recommended for the Construction and Use of Containers and Refrigerated Trucks for the Purpose of Drafting a Code" M. Balensi and P. M. Detanger (France)

15. "Insulated and Refrigerated Vehicles for Transport of Food" D. M. Proctor (Great Britain)

Commission VII

Session I: Economic Considerations

1. "The Concept of a Utilization Coefficient in Public Cold Stores" Ch. David (France)

2. "Economic Considerations on the Use of Refrigeration in French Fruit Packing Stations" R. Thevenot (France)

3. "Criterion of Maximum Economy in Planning Silos to preserve Dry Ice" U. Sellerio (Italy)

4. "Some Economic and Technical Limitations in the Practical Application of Methods of Vernalization of Wheat" M. Anquez (France)

Session II

5. "Development of French Refrigeration Equipment since the last World War" Ch. David and M. Anquez (France)

6. "On the Development of the Refrigeration Plant in Japan" S. Wateri (Japan)

7. "The Need for making use of Scientific and Rational Methods in Refrigerated Storage" L. Fontanel (France)

8. "Progress in the Field of Refrigeration in India" M. L. Khanna (India)

Session III: Education

9. "University and Technical College Education in Mechanical Engineering as a Foundation for the Training of Refrigerating Engineers" G. L. H. Bird (Great Britain)

10. "Technical Education in Refrigeration in France" Ragey (France)

11. "Visual Aids and other Techniques for the Training of Refrigerating Service Engineers" S. Pollard (Great Britain)

Session IV: Research Organization

12. "The Work of the Food Investigation Organization" R. Gane (Great Britain)

13. "The Work of the National Physical Laboratory" E. Griffiths (Great Britain)

14. "Research on the Freezing of Fish in the Netherlands" C. van den Broek (Holland)

15. "Note on the Refrigerating Installations in Morocco and the New Laboratory for Biological Research" P/Ildis (French Protectorate of Morocco)

Afternoon Visits

Visits were arranged by the Organizing Committee for the afternoons during the period of the technical programs as well as for the period between September 5 to 10. From August 30 to September 4, the following places of interest were visited by many members of the Congress:

Thomas Borthwick and Sons' Cold Store and Wharf London

British Oxygen Company, Ltd., Morden

Eldorado Ice Cream Company, Ltd., London

Express Dairy Company, Ltd., Cricklewood

General Electric Company, Ltd., Wembley

Arthur Guinness, Son and Company, Ltd., London

Hay's Wharf, Ltd., London

Imperial College of Science and Technology, London

Lister Institute of Preventative Medicine, London

Palace of Westminister, London

Closing Ceremony

The closing ceremony was opened at 10:30 am September 5 with Viscount Bruce presiding. With him on

the platform was Mr. Charles David, Mr. J. Foulon, Dr. Ezer Griffiths and Mr. W. S. Douglas. Mr. David gave a resume of the work of the various commissions which was based on the papers presented and the lively discussions which followed. He also said that the casual discussions in the halls between sessions were quite informative as were the plant visits and the visits to the Festival of England. He said that the discussion of the Technical Board should be continued between Congresses. He praised the technical work of the Congress and the British for their work in organizing the Congress.

Dr. Ezer Griffiths recommended resolutions to the Ministry of Foods and to Mr. W. S. Douglas (Chairman of the Organizing Committee) and to Mr. D. T. Lee (Secretary of the Congress).

Professor Glansdorf (Belgium), Dr. Cook (Canada), Professor Andersen (Denmark), Dr. Palmieri (Italy), Mr. Mason (New Zealand), and Mr. Jul (Italy; Food and Agricultural Organization of United Nations), each expressed their appreciation of the work done by the host nation. Professor Andersen stated the idea that the work done by the Congress helps to establish friendships between the nations. He commented in particular on the meetings being held in the shadow of Westminister Abbey where the unknown soldier is buried. He expressed a desire for peace in the years to come that the work of the Congress could progress further.

Chairman Bruce then thanked the Commissions for their work and also said that he felt the personal contacts made by those in attendance were well worth being present at the Congress. He ended the formal sessions of the Congress with best wishes to Dr. Griffiths and Mr. David for the future work of the International Institute of Refrigeration.

Luncheon and Banquet

The British Refrigeration Association gave a luncheon on Friday, August 31, at which the Congress members were guests. After the toast to the King of England, Mr. R. H. Line (Member of Council, BRA), Sir Norman Kipping (Director-General, Federation of British Industries), and Mr. M. A. H. Bellhouse (Member of Council, BRA) proposed toasts to the Congress, the British Refrigeration Association, and the Chairman of the British Refrigeration Association, respectively. Responses to the toasts were made, respectively, by Mr. A. G. Bottomley (Secretary for Overseas Trade-Board of Trade), Mr. E. G. Batt (Secretary and Director of BRA), and Mr. A. E. Leach (Chairman, BRA). Each of the responses stressed the need for better distribution of critical materials to the refrigeration industry. Mr. Batt, in particular, said that a strong export trade must have a strong domestic trade.

The Congress Banquet was held on the evening of September 4 in the Connaught Rooms with Viscount Bruce presiding. Mr. McKeown, representing the Honorable T. W. White, High Commissioner for the Commonwealth of Australia stressed the worth refrigeration had been to Australia. Mr. W. S. Douglas gave a toast to the overseas visitors and commented on the large representation (320) from overseas, and Mr. Paul Christensen (president, ASRE) responded and agreed with a previous comment that it would be good if the next Congress was in the United States. Mr. A. Blanc (Director-General of Engineering Services, Ministry of Agriculture, France) also responded to Mr. Douglas' toast.

Extended Visits

After the formal sessions of the Congress were closed, visits to a large number of places were made, one of these being a trip through the Highlands of Scotland from September 5 to 10, inclusive. This trip was made by 63 people, representing 14 nations. In addition to historical and scenic sights in the Highlands of Scotland, several plant and laboratory visits were made in Glasgow, Aberdeen and Edinburgh. This trip was sponsored by the Scottish Association of Cold Storage and Ice Trades and ended with a dinner at Edinburgh on Monday evening (September 10) given by this group.

American Participation in International Institute

A group representing member nations of the International Institute of Refrigeration met with four members of the American Society of Refrigerating Engineers from the United States at 3:00 p.m. August 30. Dr. Ezer Griffiths (President of the Technical Board of the International Institute of Refrigerating) (Great Britain) was chairman for the afternoon.

Others present were Mr. Paul B. Christensen (pres., ASRE), Prof. Carl Kayan (Columbia University), Mr. W. T. Pentzer (U.S. Dept. of Agriculture), Professor Byron E. Short (Univ. of Texas), Professor S. A. Andersen (Denmark), Mr. M. Jul (Food and Agricultural Organization) (Italy), Dr.-Ing. D. Palmieri (Italy), Mr. R. Thevenot (France), Mr. Charles David (Director of the International Institute of Refrigeration) (France), Mr. J. Foulon (Belgium), Mr. J. van Snick (Belgium), Mr. M. Bosquet (Great Britain), Mr. Wynne Mason (New Zealand), Miss W. Griffin (Ministry of Foods) (Great Britain), Professor F. E. Simon (Oxford University) (Great Britain), and Mr. A. H. Waterfield (Great Britain). Madam Pelletier (Secretary of the International Institute of Refrigeration) (France) was secretary for the afternoon.

Dr. Griffiths proposed that an informal discussion be held of the possibility of the United States becoming a member of the International Institute of Refrigeration. Mr. Christensen pointed out that the average member of ASRE and many with technical interests in refrigeration in the United States preferred that the government not be concerned with such organizations and that it was an individual's privilege.

Professor Simon raised the question of whether or not with such a feeling it was possible to develop an interest in the international organization in the United States. The content of the reply to Professor Simon's question was that an educational program in the USA to show individuals what the possibilities of the International Institute were could very easily create an interest here.

A second expression which had been proposed earlier by Mr. David was that an individual membership might be possible through classification as corresponding members or a group of interested individuals could be classed as "Friends of I. I. R." and thus make the USA effectively a member.

It was proposed that information be given to Refrigerating Engineering, ICE AND REFRIGERATION and Food Technology which would show the functioning and plans of the International Institute of Refrigeration.

A possible means was proposed for combining some of the features of the Abstracts of the Bulletin (of I.I.R.) and Refrigeration Abstracts (of ASRE) to make the coverage more complete and minimize the work of abstracting. It was agreed that Refrigeration Abstracts were in general too brief and that many of the I.I.R. Abstracts were longer than should be to suit many busy people.

Professor Andersen proposed that the Bulletin of the I.I.R. give discussions on units used in various countries, the different test codes, etc., with the idea of educating individuals of respective countries on practices elsewhere so that differences in usage could be gradually decreased.

American Participation

The proposal concerning the way Americans could actively participate in the International Institute of Refrigeration was presented to the formal meeting of the Technical Board of I.I.R. on Monday, September 3. Unofficial information from the meeting indicated that the proposal was approved but no information was available relative to the amount of dues and specific privileges of membership.

Officials of Congress

Officials of the Congress were as follows:

Presidents

The right Hon. Viscount Bruce of Melbourne, P.C., C.H, M.C., F.R.S.
Professor W. J. De Haas

Honorary Presidents

His Excellency the Right Hon. W. J. Jordan, High Commissioner for New Zealand

His Excellency M. Rene Massigli, G.C.V.O., K.B.E., Ambassador Extraordinary and Plenipotentiary of France

The Hon. T. W White, D.F.C., V.D., High Commissioner for Australia

The Right Hon. P. C. Gordon-Walker, M.P., Secretary of State for Commonwealth Relations

The Right Hon. Sir Hartley Shawcross, K.C., M.P., President of the Board of Trade

The Right Hon. Maurice Webb, M.P., Minister of Food

The Right Hon. Lord Mayor, Alderman Sir Denys Lowson, Bart., Lord Mayor of London

The Right Worshipful the Mayor of the City of Westminster, Councillor A. Sciver, J.P., D.Sc., F.R.I.C.

Vice-Presidents: Lt. Col. Lord Dudley, Gordon, D.S.O.; The Right Hon. Lord McGowan, K.B.E., D.CL., LL.D.; The Right Hon. Lord Cherwell, P.C., F.R.S.; Sir Ben Lockspeiser, K.C.B., M.A., D.Sc.; Brig. General Sir Harold Hartley, K.C.V.O., C.B.; Sir Gordon Huntly Campbell, K.B.E.; Sir Samuel R. Beale, K.B.E.; Sir Francis T. Boys, K.B.E.; Sir Archibald J. Gill, B.Sc.; B. T. Aitken; E. G. Batt, P. B. Christensen; Dr. C. H. Clarke. O.B.E.; Dr. S. F. Dorey, C.B.E., F.R.S., Wh. Ex.; W. S. Douglas. B.Sc.; Dr. W. H. Glanville, C.B.E.; Prof. C. J. Gorter; Dr. E. Griffiths, OB.E., F.R.S.; A C. Hartley, C.B.E., B.Sc.; J. S. Hutchison; Kenneth Lightfoot, O.B.E., W.A.P. Milne, B.Sc.; Dr. H. Queuille; J. Raymond; Eugene Ruddin; Prof. F. E. Simon, C.B.E., F.R.S; Dr. F. A. Willcox; Dr. N. C Wright, M.A.

Chairman of Organizing Committee: W. S. Douglas, B.Sc.

Honorary Treasurer, Colonel H. Randal Steward, B.Sc. (Eng.)

Honorary Secretaries General: C. David; J. Raymond

Secretary, D. T. Lee, Dalmeny House, Monument Street, London, E. C.3.

Assistant Secretary, Miss U. M. N. Ure, B.Sc. (Econ.)

Congress Committees

Organizing Committee: Chairman, W. S. Douglas, B.Sc.; members of committee: E. G. Batt; C. M. Brain; J. H. Brier; J. Douglas, B.Sc.(Eng.); Dr. J. C. Fidler, B.Sc.; Dr. E. Griffiths, O.B.E., F.R.S.; Representative of the Ministry of Food; Representative of the Foreign Office; Dr. G. G. Haselden; J. Raymond; S. H W. Richards; Prof. F. E. Simon, C.B.E., F.R.S.; Col. H. Randal Steward, B.Sc.(Eng.)

Finance Committee: Chairman, W. S. Douglas, B.Sc.; members of committee: E. G. Batt; Col. H. Randal Steward, B.Sc.(Eng.)

Hospitality Committee: J. Douglas, B.Sc.(Eng.); members of committee: E. G. Batt; J. A. Brewster; J. Raymond; Col. H. Randal Steward, B.Sc. (Eng.); J. C. Taylor.

Papers Committee: Chairman: Dr. E. Griffiths, O.B.E., F.R.S.; members of committee: G L. Bird, B.Sc.; C. M. Brain; A. O. B. Brandon, B.A; J. C. Fidler, B.Sc.; G. G. Haselden; E. M. Heap, M.Eng.; M. R. Holmes, H. R. Howells; G. G. Lilley, B.A.; B.C. Oldham; T. A. Raymond; S. H. W. Richards; Prof. F. E. Simon, C.B.E., F.R.S.

Publicity Committee: Chairman: J. Raymond; members of committee: E. G. Batt, W. Kirkby, T. A. Raymond; J. Willis.

Visits Committee: Chairman: C. M. Brain; members of committee: E. G. Batt; G. L. H. Bird, B.Sc.; J. H. Brier; R. H. Hemmings; W. A. P. Milne, B.Sc.; Eng.—Cmdr. W. R. Sinclair, R.A.N., B.Eng.; J. A. Stonebanks.

Secretary to the Congress Committees: D. T. Lee.

Cold Storage and Ice Plant Sues for Flood Damage

THE Midwest Cold Storage & Ice Corporation, a flood damaged industry of Kansas City, Kan., filed a suit for payment of $425,000 under insurance policies the corporation holds with the Maryland Casualty Co., Baltimore. The action was filed in the United States District Court, Kansas City, Kans.

The petition sets out that the insurance company is liable for the maximum payment of $100,000 for "the sudden and accidental cracking of the refrigeration system on or about July 13." The petition does not state that the cracking resulted from the flooding Kaw river on that date.

The plaintiff also seeks $25,000 for damage to "products solely in cold storage," and a daily indemnity of $1,000 a day for each day of total or partial prevention of business because of the cracking of the refrigeration system.

The petition, filed by Donald C. Little and Frank L. Bates, Kansas City, Kansas, attorneys, sets out that the plaintiff has made a demand for payment but that the defendant had refused to pay. A jury trial is requested.

Millionth Traffic Victim Soon to Be Recorded

WHO will be the one millionth person to die in a traffic accident? Where will it happen? Exactly when? The National Safety Council has said the answers to those questions will never be known.

If the present rate of traffic deaths continues, some time next December a child will dart into the street, a homeward-bound salesman will try to pass a truck on a hill, a young couple will hurtle off a ourve on the way to a dance, an old woman will become confused crossing a street, and the millionth traffic victim will pass unheralded into a dusty police file.

But even though the actual identity of the millionth victim will remain a mystery, the Council has made plans which will enable it to name the fateful day as a climax to an intensive safe driving campaign in which all safety organizations are cooperating.

The Council announced it is setting up the machinery to supplement its regular monthly reports with special weekly summaries from the states. On November 15, the Council will begin issuing weekly bulletins on the grand total of traffic deaths since the advent of the automobile. These bulletins also will forecast the probable date of the millionth fatality.

"Our only purpose in trying to identify such a grim date in history is to dramatize the horror of such a huge traffic toll," said Ned H. Dearborn, Council president. "Perhaps 1,000,000 dead—almost twice the number of Americans who have died in combat in all our wars—will crack the apathy of a nation which can see 35,000 persons killed by autos in a year without much concern.

As far as the National Safety Council can discover, the first fatal motor vehicle accident on record occurred in New York City in September, 1899. Mr. H. H. Bliss stepped off a trolley car and turned around to assist a woman who also was getting off. A passing automobile struck him. It stopped and the passenger, who was a doctor, rendered first aid. However, the following day, Mr. Bliss' death occurred in the Roosevelt Hospital.

"It has taken a little more than 50 years to kill the first million. If traffic deaths continue at the present rate, it will take only 30 years to kill the second million. We can only hope that this terrible day of seven-figure reckoning will become a safety milestone—not just another gravestone—on the road to more responsible use of the automobile."

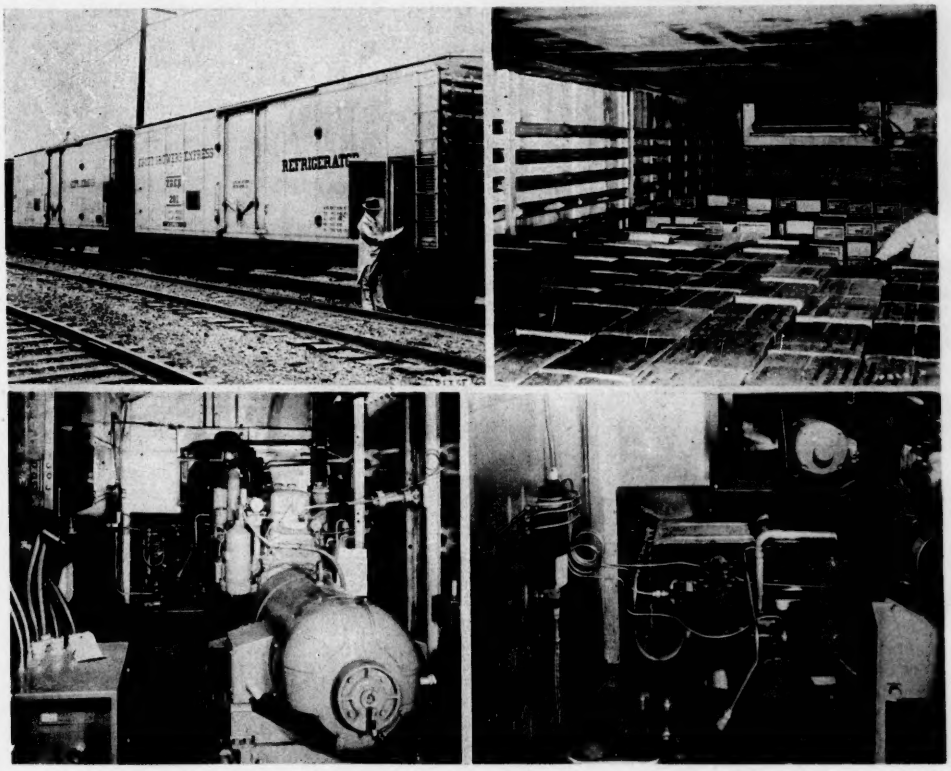
New Low Temperature Refrigerator Cars

SPARKED by the large volume of frozen juice concentrate, there has been a demand for railroad refrigerator cars which can maintain 0 F temperature throughout the car interior. Frozen food producers desire continuous temperature of 0 F or less for their goods during storage, transportation, distribution and retail sale. (Humphrey, ICE AND REFRIGERATION, Aug. 1951, page 52).

To provide this type of service in rail transportation the Fruit Growers Express Co. began more than two years ago to utilize refrigerator cars with individual cooling plants installed in them. By spring of this year the number of these cars in service totalled more than fifty and a program is being followed to increase this number substantially.

Individual Cooling Plant

Refrigerating equipment in each car is independent with power furnished by a diesel driven alternating current generator. Other main units are a refrigerating compressor with motor drive, air cooled condenser and a forced air refrigeration unit. All this equipment is in one end of the car while the fuel storage tank is located beneath the car.



Upper left: This is a view of a Fruit Growers Express car being checked for a temperature reading and operating performance. The louvered door to the machine compartment opens to reveal the controls and refrigerating equipment. The units can be stopped and started without entering the car. Temperature of the interior can be checked without opening the compartment door by reading a dial thermometer on the outside of the car.

Upper right: View of a partially loaded car shows the forced air cooling unit in the upper rear against the ceiling. The cold air is blown out along the ceiling, circulates down the walls and through the load to return beneath the floor racks.

Lower left: Inside the machine compartment at the end of the car. The Diesel driven alternating current is at right foreground. The refrigerating compressor is at rear with the engine cooling radiator above it. At left is the electric switch box and other controls.

Lower right: Close up view shows the motor driven Freon-12 compressor with the air cooled condenser behind it. Dual fans discharge air from the machine compartment through the condenser to the outside.

All power for operating the refrigerating compressor fans and auxiliaries is produced by the engine generator set. It consists of a 34 hp diesel engine driving a 20 kw, 60 cycle, 220 volt, three-phase alternating current generator. The power system is arranged to operate automatically to produce the required power. The 320 gal. fuel tanks to supply the Diesel engine are located beneath the car.

Local Power Used

The entire system is arranged so that during long periods of pre-cooling or for stand-by service, the compressor and refrigerating equipment can be plugged in on the local power source.

The radiator for engine cooling and the refrigerant condenser draw air through a louvered opening at one end of the engine compartment and discharge through the heat transfer equipment to the outside at the other end of the compartment.

The refrigeration of the car interior is accomplished by a forced draft cooling coil suspended at the ceiling beside the partition which separates the machinery compartment from the car. This cooling coil blows the air out over the contents of the car. Spaces along the car walls allow for cold air circulation and the air returns to the coil by way of the passages under the floor racks and the return duct into the suction side of the refrigerating unit.

The engine and electric control box is located just inside the louvered door which gives access to the machine compartment. Thus these controls can be inspected without entering the car. Beside the compartment door are dial thermometers which show the interior temperatures maintained by the car at all times. It is possible to read these thermometers without opening the machine compartment or going into the lading space in the car.

Fuel Oil Consumption

According to the Frigidaire Division, General Motors Corp., which furnished the equipment for the car, the power to drive the refrigerating system is produced by the consumption of only eight-tenths of a gallon of fuel oil per hour. On a ten-day trip from Hillsboro, Ore. to Jersey City, N. J., the average consumption of fuel would be 220 gal. costing about 42 dollars for the entire coast-to-coast trip.

They declare that the cars have required very little servicing. The current plan, as announced recently, is to attempt extensive service only at strategic points which may be several days apart. Between these points, possibly at each of the present icing stations, men will be stationed to inspect the cars and refrigeration equipment and record gage readings and temperatures.

Refrigeration Safety Committee Meets Plans Increased Program

IN CONNECTION with the National Safety Congress, there was a meeting of the Refrigeration Safety Committee. It was arranged by the National Safety Council in cooperation with representatives of the Refrigeration Service Engineers Society and the National Association of Practical Refrigerating Engineers as well as other industry representatives.

The primary purpose of the meeting was to accomplish preliminary work toward the organization of a cooperative safety program. The activity is aimed at a section of the field not now covered by any well integrated activity.

Chairman of the meeting was Paul Reed, educational director of R.S.E.S. He opened the meeting with a discussion of the variety of fields affected as users of refrigeration. This large and important section of industry, he said, should have a well-organized accident prevention program with broad participation by the different factors in the refrigeration industry.

Early Work

The earlier work of the Refrigeration Section in the National Safety Council was discussed by William Davis, senior engineer, Industrial Department. He told how that section had been in operation for approximately fourteen years and had been utilized by certain sections of the refrigerating industry to aid in solving their safety problems. In 1944 because of lack of general interest, the refrigeration section had been disbanded and a Refrigeration Division had been set up in the Food Section. It has not been able, however to enlist the interest of more than a very few council members. The interest more recently demonstrated by men in the user and service sides of the refrigeration industry, he declared, gave justification for steps to reactivate the Refrigeration Section.

Safety in Service

The work of R.S.E.S. on safety and accident prevention was described by George Schuld, Cleveland, International Safety Chairman of that organization. He showed the excellent posters and other educational material which have been produced to aid their membership in reducing accidents and injuries. Direct work with public agencies including the newspapers and government officials was described to show the effect of campaigns such as those designed to prevent the entrapment of small children in abandoned refrigerators. Mr. Schuld recommended a well coordinated effort to place the resources and the forces of the industry behind a good accident prevention program.

Training for Safety

"Safety in Industrial Refrigeration" was discussed by Emerson Brandt, secretary of the N.A.P.R.E. In the beginning, Mr. Brandt assured the audience that it was not the purpose of the committee to delve into any plant safety program of refrigeration equipment manufacturers. Rather the central objective is to emphasize manpower training related to refrigeration used for industrial processing and storage as well as the men who service or maintain refrigeration equipment.

He discussed the problems and hazards existing in the field, pointing out that they are not great in comparison with some other industries. Yet the unwanted by-product of accidents would be much too large if proper training and prevention work are not organized. This course has been demonstrated to be effective and valuable by the members of the National Safety Council. Accident experience in the refrigeration industry was reviewed and numerous steps toward improvement were described. Among the valuable tools for improvement, he listed the American Standard Safety Code for Mechanical Refrigeration.

The meeting was concluded with a general discussion of the logical steps to be followed in setting up a coordinated program of accident prevention on a cooperative basis among the different factors of the refrigerating industry. It was decided that a committee should draw up a statement of the scope of the work and then invite representatives of the associations and others interested to meet and plan a permanent organization.

THE ENERGY CONTENT OF FOODS

The specific heat and energy content of foods to be removed by freezing, as determined by experimental measurement of energy supplied to food sample to raise its temperature

BYRON E. SHORT
HORACE E. STAPH

Professor and Assistant Professor
Mechanical Engineering,
University of Texas, Austin, Tex.

Introduction

FOODS such as vegetables, fruits and meats are chemical and mechanical mixtures. The constituents of the mixtures may be considered to be water, fats, sugars and salts, and solids. Some of the solids (other than sugars and salts) also should be classed as water soluble solids.

The energy which must be removed from a particular foodstuff, in order to lower its temperature from that at which it is received to that at which it is to be stored, is the sum of the sensible energy removed from each constituent and the latent heat of fusion of the water and the fats. The fats may not undergo a freezing change within the normal freezing storage temperature range. Hence, only the heat of fusion of the water which is frozen should be considered. A simple "mechanical" mixture basis for the determination of the energy removed would neglect the energy of solution, which may be appreciable for many foods.

The results which are presented in this paper are based on the experimental measurement of the energy supplied to a food sample to raise its temperature. The temperature rise increment was made small in each case to permit the measured state, as a function of the temperature, to be as close as possible to the true or instantaneous state at a given temperature. Because of a change in the food condition during freezing, the reversed process (heating) may be different from the freezing process.

From paper presented at Eighth International Congress of Refrigeration.

Experimental Apparatus and Procedure

The energy supplied to cause an increase in the food temperature was determined by calorimeters. The early work[1, 2] was done with a calorimeter in which the food was frozen (or heated) without being in contact with a bath, the energy being transferred through the wall of a thin metal container to (or from) the food, the temperature of the food being measured near its center of mass.

[1] Short, Byron E. and Luis H. Bartlett, "The Specific Heats of Foodstuffs" Bulletin No. 4432, the University of Texas, August 22, 1944.

[2] Short, B. E., W. R. Woolrich and L. H. Bartlett, "Specific Heat of Foodstuffs" Refrigerating Engineering, vol. 44, no. 6, pp 385-388, December 1942.

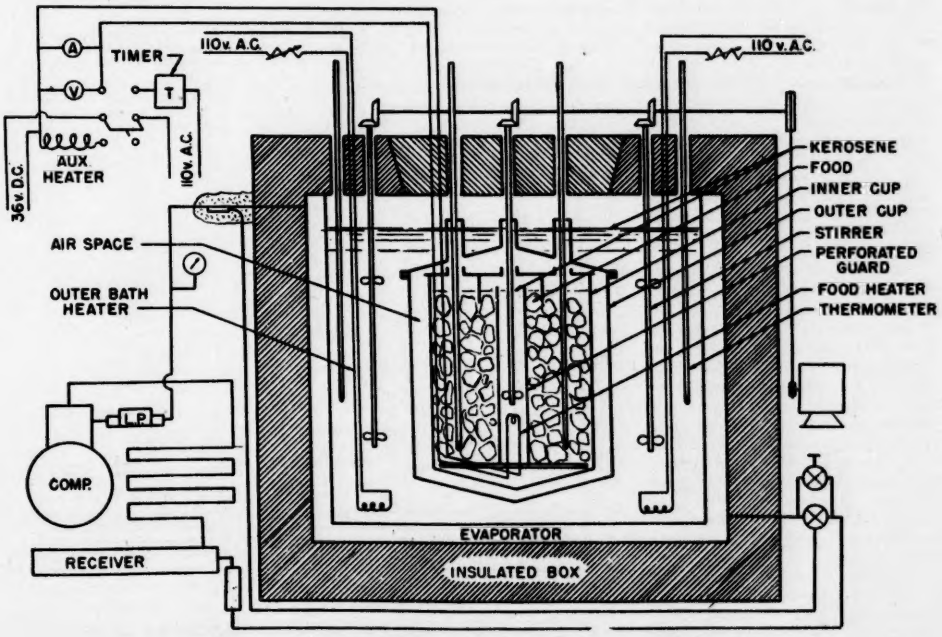


Fig. 1—Food Calorimeter used in the experiment

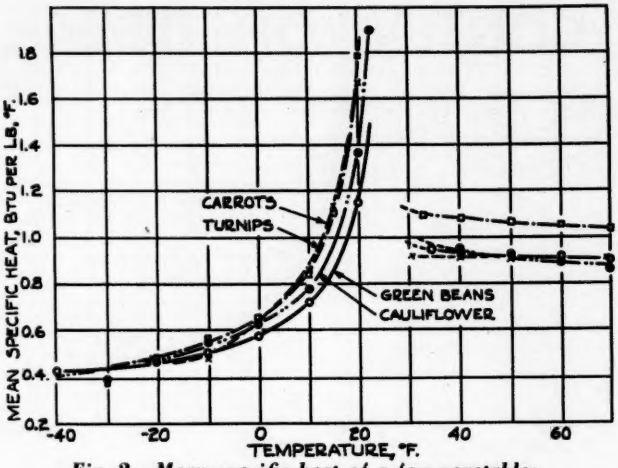


Fig. 2—Mean specific heat of a few vegetables

With small energy additions and with a large time allowance for thermal equilibrium, transient phenomena apparently were small. These transient phenomena caused difficulty, however, in reproducing results.

The last work has been done with a calorimeter in which the food is immersed in a kerosene bath, the food being cut in small pieces to allow intimate contact with the bath (see Fig. 1). A stirrer in the center of the food container (inner cup) keeps the bath in circulation through the food pieces and thereby reduces the transient heat flow through the food mass.

The bath around the food container was heated (in this later work) as the food container was heated so as to maintain a small temperature difference and thereby make the heat loss from the container and the energy stored in the container wall low.

The calorimeters were calibrated in each case to permit the evaluation of the actual heat losses and changes of energy stored in the calorimeter parts during the experimental work with a particular food. From these data and the measured energy input for a particular determination, the net energy input to the food or its true temperaure rise was determined.

The energy was supplied electrically to the food and container in both the early work and this last work. The energy supply rates were measured by a voltmeter and an ammeter in the circuit.

In addition to the thermal energy data, for the early work, only the water content and the initial freezing points were obtained for each food, while, in the later work, the fat content and the water soluble solids content have also been determined.

Results

A typical example of the results obtained by the experimental procedure (showing specific heats as a function of temperature) is shown by Fig. 2. Other results[1, 2, 3, 4] are similar to these, being different generally in the kind of food, but slight differences exist between results of the first work and those of this later work. These differences have been thought to be due to transient phenomena.

Tabular values including enthalpies (calculated with —40 F as the base) and specific heats are given in the Table. The specific heat values in this table were obtained from the experimentally determined curves.

Experimental versus Mixture Calculation Results

In order to calculate the energy removed in cooling foodstuff, or to calculate its enthalpy above a reference temperature, the specific heat of the constituents, the latent heat of fusion of the frozen part (or unfrozen, if heating), and the heat of solution must be used.

Specifically, suppose that the enthalpy of a food at t deg. F. is to be determined. Assume constant specific heats of water, ice, solids and fats. If the percentages of unfrozen water and unsolidified fats are known, the enthalpy per unit weight above —40 F is as follows. (See Fig. 3).

$$h_t = dc_{ps}(t+40) + e_t + c_{pws}(t+40) + b_t c_{pf}(t_y+40) + c_{pf}\left(b_t - \frac{b_u}{2}\right)(t-t_y) + \frac{b_u c_{pfl}}{2}(t-t_y) + a_t c_{pl}(t_x+40) + c_{pl}\left(a_t - \frac{a_u}{2}\right)(t-t_x) + \frac{c_{pw} a_u}{2}(t-t_x) + a_u h_{if} + b_u h_{iff} + (e_t - e_s)E_s \quad \ldots\ldots(1)$$

[3] Staph, H. E., "The Specific Heats of Foodstuffs", Refrigerating Engineering, vol. 57, no. 8, pp 767-771, 829, August 1949.

[4] Staph, H. E. and W. R. Woolrich, "The Specific and Latent Heats of Foodstuffs through the Freezing Zone", submitted to A.S.R.E. April 1951.

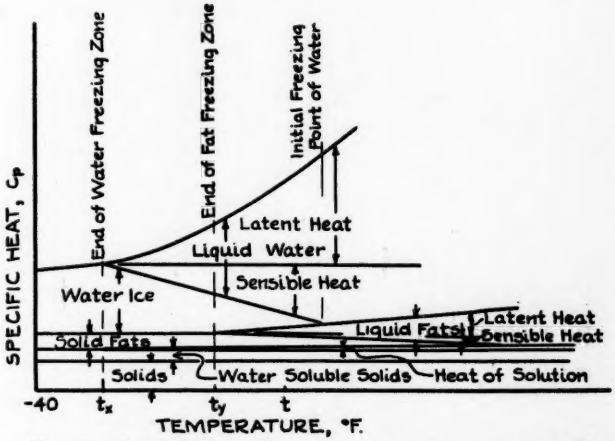


Fig. 3—Contribution of various components on specific heat

TABLE I—THERMAL AND CHEMICAL CHARACTERISTICS OF A FEW FOODS

CAULIFLOWER*

% Water 90.7
% Fat 0.30
% Water soluble solids 3.48

Temp. F.	Cp Btu/lb F	h Btu/lb
−40	.42	0
−30	.44	4.3
−20	.47	8.9
−10	.53	13.9
0	.62	19.7
10	.77	26.7
20	1.37	36.8
30.1	#	
36.7	1.05	164.0
40	.95	167.3
50	.92	176.6
60	.89	185.7

TURNIPS*

% Water 94.1
% Fat 0.22
% Water soluble solids 1.95

Temp. F.	Cp Btu/lb F	h Btu/lb
−40	.42	0
−30	.44	4.3
−20	.48	8.9
−10	.55	14.1
0	.64	20.1
10	.84	27.4
20	1.78	39.5
30.2	1.09	155.2
34.7	1.08	160.1
40	1.08	165.8
50	1.06	176.5
60	1.05	187.1

TOKAY GRAPES

% Water 82.7
% Fat 3.40
% Water soluble solids 10.1

Temp. F.	Cp Btu/lb F	h Btu/lb
−40	0.60	0.00
−30	0.60	5.95
−20	0.63	12.1
−10	0.75	18.9
0	0.99	27.4
10	1.42	39.1
20	3.47	60.0
24.2	0.87	134.1
40	0.87	147.8
50	0.87	156.5
60	0.87	165.2
70	0.87	173.9

RED FISH

% Water 84.7
% Fat 1.06
% Water soluble solids 0.17

Temp. F.	Cp Btu/lb F	h Btu/lb
−40	0.41	0.00
−30	0.42	4.12
−20	0.44	8.38
−10	0.46	12.8
0	0.51	17.7
10	0.71	23.7
20	1.21	32.9
31.4	0.81	124.2
40	0.81	131.2
50	0.81	139.2
60	0.81	147.2
70	0.81	155.2

GREEN SNAP BEANS*

% Water 92.9
% Fat 0.33
% Water soluble solids 3.32

Temp. F.	Cp Btu/lb F	h Btu/lb
−40	.42	0
−30	.44	4.27
−20	.46	8.74
−10	.50	13.5
0	.57	18.9
10	.73	25.3
20	1.06	34.2
30.7	0.98	171.3
34.4	0.95	174.9
40	.94	180.1
50	.93	189.5
60	.93	198.8

CARROTS*

% Water 90.0
% Fat 0.31
% Water soluble solids 0.70

Temp. F.	Cp Btu/lb F	h Btu/lb
−40	.42	0
−30	.43	4.25
−20	.47	8.70
−10	.53	13.7
0	.65	19.6
10	.87	27.0
20	1.68	38.9
30.4	0.92	152.1
40	0.91	160.4
50	0.91	170.0
60	.91	179.1

BLACK-EYED PEAS

% Water 64.2
% Fat 1.30
% Water soluble solids 9.79

Temp. F.	Cp Btu/lb F	h Btu/lb
−40	.43	0
−30	.43	4.3
−20	.44	8.7
−10	.50	13.3
0	.60	18.6
10	.80	25.5
20	1.63	36.4
30.2	.71	114.2
37.5	.71	119.5
40	.71	121.3
50	.71	128.4
60	.71	135.5

BROCCOLI

% Water 91.1
% Fat 0.17
% Water soluble solids 0.084

Temp. F.	Cp Btu/lb F	h Btu/lb
−40	.45	0
−30	.48	4.7
−20	.52	9.7
−10	.57	17.1
0	.65	23.1
10	.82	30.5
20	1.59	41.4
29.5	.84	150.4
36.3	.85	156.1
40	.86	159.3
50	.87	167.9
60	.88	176.5

CUCUMBERS

% Water 96.1
% Fat 0.07
% Water soluble solids 1.66

Temp. F.	Cp Btu/lb F	h Btu/lb
−40	0.45	0.00
−30	0.48	4.60
−20	0.49	9.47
−10	0.53	14.5
0	0.58	20.0
10	0.70	26.7
20	1.36	36.2
30.1	0.92	140.8
40	0.92	148.9
50	0.92	159.1
60	0.92	167.3
70	0.92	176.5

DELICIOUS APPLES

% Water 84.6
% Fat 0.07
% Water soluble solids 1.66

Temp. F.	Cp Btu/lb F	h Btu/lb
−40	0.51	0.00
−30	0.52	5.10
−20	0.56	10.5
−10	0.65	16.5
0	0.84	23.9
10	1.22	33.8
20	3.01	52.8
29.1	0.88	137.7
40	0.88	147.3
50	0.89	155.8
60	0.89	164.7
70	0.90	173.6

GULF SHRIMP

% Water 76.3
% Fat 0.51
% Water soluble solids 0.06

Temp. F.	Cp Btu/lb F	h Btu/lb
−40	0.40	0.00
−30	0.43	4.13
−20	0.46	8.55
−10	0.51	13.4
0	0.60	18.9
10	0.87	26.2
20	1.61	38.0
30.3	0.87	128.7
40	0.86	137.1
50	0.86	145.7
60	0.85	154.2
70	0.85	162.7

LEAN BEEF

% Water 76.0
% Fat 1.11
% Water soluble solids 1.26

Temp. F.	Cp Btu/lb F	h Btu/lb
−40	0.42	0.00
−30	0.42	4.15
−20	0.45	8.42
−10	0.52	13.2
0	0.63	18.9
10	0.80	25.9
20	1.59	36.7
30.1	1.00	120.1
40	0.82	129.1
50	0.76	134.8
60	0.73	142.2
70	0.82	150.0

* Marks the initial freezing point tested more than once, with close correlative results tested on improved equipment.

\# Undetermined.

where:

- a_t=total water content of food (fraction by weight)
- a_u=unfrozen water content (fraction by weight)
- b_t=total fat content (fraction by weight)
- b_u=unfrozen fat content (fraction by weight)
- d=solid content (fraction by weight)
- e_t=total water soluble solid content (fraction by weight)
- e_s=water soluble content left in solution at the particular temperature (fraction by weight)
- c_{pi}=specific heat of water ice
- c_{pf}=specific heat of solidified fats
- c_{pfl}=specific heat of liquified fats
- c_{ps}=specific heat of solids
- c_{pws}=specific heat of water soluble solids

CATFISH

% Water 78.1
% Fat 3.34
% Water soluble solids 0.05

Temp. F.	Cp Btu/lb F	h Btu/lb
−40	0.42	0.00
−30	0.43	4.24
−20	0.44	8.57
−10	0.48	13.1
0	0.54	18.1
10	0.68	24.2
20	1.04	32.8
31.1	0.86	134.4
40	0.83	141.9
50	0.82	150.1
60	0.82	158.3
70	0.83	166.6

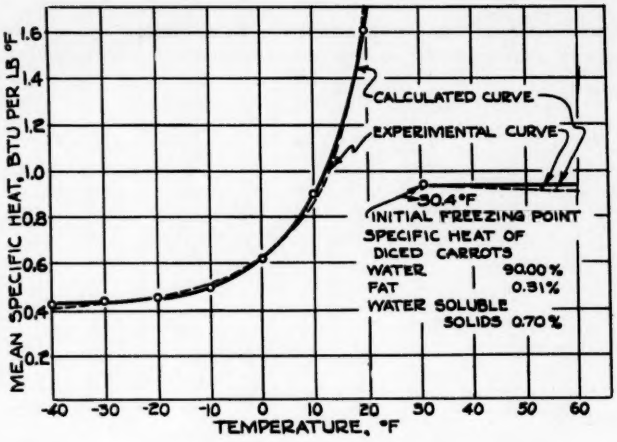


Fig. 4—A comparison of the experimentally detemined and the calculated specific heats.

c_{pw}=specific heat of liquid water
h_{if}=latent heat of fusion (or enthalpy of fusion) of water
h_{iff}=latent heat of fusion of fats
t_x=temperature at which all of water is frozen
t_y=temperature at which all of fats are solidified
E_s=heats of solution per unit weight of water soluble solids.

In equation 1, it is assumed that the sensible energy change of the water soluble solids is the same whether in or out of solution.

It is quite likely that a negligible portion of the fats is left unsolidified when the foods have been cooled to the initial freezing temperature since they exist more as a mechanical mixture with the other constituents, and animal and vegetable fats solidify, in general, above 32 F. Hence, during the "freezing" range, the fats may be treated as a single phase.

To calculate the enthalpy of a substance, at a particular temperature, for which experimental data are not available, it seems sufficiently accurate to assume that the heat of solution is also negligible. Also, it seems reasonable to include the sensible enthalpy of the water solubles with that of the other solids. That is

$$h_t = (dc_{ps}+b_tc_{pf}+a_tc_{pi})(t+40)-\frac{a_uc_{pi}}{2}$$
$$(t-t_x)+\frac{a_uc_{pw}}{2}(t-t_x)+a_uh_{if} \quad ....(2)$$

where d=total solids content (including water solubles).

An allowance may be made for the temperature variation of the specific heat in each case. A mean value for each temperature increment range was used in comparing the experimental data with a mechanical mixture. The specific heat of the liquid water should be that of the solution with the dissolved water soluble solids in the temperature range under consideration if the water soluble solids are not treated with the other solids.

Values of Specific Heat

The calculated values of the specific heat shown by Fig. 4 were obtained by assuming that the percentage of unfrozen water at a particular temperature was the same as that calculated for the same temperature for the experimental curve. The percentage of unfrozen water was determined, at a given temperature, for the foodstuffs by assuming that the energy content (enthalpy) above -40 F consisted of the sensible enthalpy of the water ice, sensible enthalpy of the solids, sensible enthalpy of the fats, sensible enthalpy of unfrozen water, and latent heat of fusion of the unfrozen water. This neglects the latent heat of fusion of the fats, and the heats of solution. Further, it was assumed that c_{pi} varied from 0.43 at —40 F to 0.505 at 32 F, c_{pf} = 0.34, c_{ps} = 0.24, and h_{if} = 144 Btu per lb.

It is quite likely that the closeness of the calculated curve (Fig. 4) to the experimentally determined curve is a result of what may be a false percentage of unfrozen water. The tabular values of specific heat and enthalpy, however, are a result of the integration of the experimentally determined curve and therefore do not involve this assumption.

Standardization Order for Refrigeration Industry

A PROPOSED simplification and standardization order to conserve critical metals in the commercial and industrial refrigeration and air conditioning industry was discussed September 25 at a meeting of the manufacturers' industry advisory committee and the National Production Authority. The order would prohibit production of equipment not conforming to certain sizes, types, grades, finishes, and other specification. The draft was prepared by NPA in consultation with different segments of the industry.

However representatives of the commercial refrigeration and air conditioning industry rejected the proposed order on the ground that there is no need for standardization and simplification of the industry's products now. Representatives of NPA then stated that the order would not be issued unless there is complete acceptance by the industry concerned.

In a discussion of the proposed order, NPA said that even if issued, the order would not assure the allotment of more materials to the refrigeration and air conditioning manufacturers, but it would permit them to produce more of certain types of units with available materials.

In a review of the metals situation, NPA reported that:

1. Steel sheet and strip supplies should be heavier in the first quarter of 1952. But galvanized sheet will remain severly low because of the zinc shortage.

2. The scarcity of copper will continue for at least four more years. There is ample productive capacity, but copper ore and scrap are seriously short.

3. Aluminum supplies will be reduced in the fourth quarter and the first quarter of 1952 because of the hydroelectric power shortage in the Pacific Northwest. Production will increase within two years, with the development of additional power sources and productive facilities.

Refrigeration Training

NEW apprentice training in refrigeration as a prime subject was launched with the new school season recently opening at the Edison Technical school operated in conjunction with the public schools of Seattle, Wash. Classes are operated under sponsorship of a joint apprenticeship committee in accordance with regulations of the Washington State Apprenticeship Council, membership being limited to indentured apprentices.

Safety in Industrial Refrigeration

EMERSON BRANDT
Secretary, National Association Practical Refrigerating Engineers
Chicago, Ill.

SPEAKERS are sometimes classified according to the introduction they use. You are familiar with the Webster approach, the Historical approach and others. In the former we would change our simple subject of Safety in Industrial Refrigeration to something like this:

"The Promotion of Bodily Security in Gainful Occupations Utilizing Cryogenic Equipment".

Then we would read slowly and carefully the Webster definitions of the important words in the title.

That procedure will be avoided here but it is necessary to establish certain limits for our field. It is confined to refrigeration used for industrial processing and storage and the men who service or maintain refrigeration equipment. By this course we allay the fears of people in the household appliance and related fields who become troubled when we urge more attention to safety and accident prevention. They fear their customers will be alarmed when we discuss hazards in refrigeration.

Hazards Not Great

At the outset let us also admit that our hazards are not really great. The fatalities and serious injuries in refrigeration work are not frequent as compared with auto traffic and others which have regular treatment in the newspapers. Yet they are important to us because we are involved directly. Also industrial refrigeration is growing rapidly and the unwanted by-product of injuries will grow at an equally rapid rate if we neglect our prevention work.

There is a disarming simplicity about many of our operations and activities. A few small pieces of ice on the floor of a low temperature room or ice plant are frequently overlooked, but neglect of them causes falls and serious injuries. The filling of a service cylinder with refrigerant is a simple job. Yet if you really fill it you have a time bomb on your hands.

Another basic problem is the size of the individual operation. Many industrial refrigeration plants employ relatively few people. Many plants that use refrigeration are not large in total number of workers employed. Any particular refrigeration service job usually involves only one or two people. The problem of education, supervision and group action to promote safety cannot be solved here by the procedure used in large manufacturing plants.

Further, this dispersion in the field tends to cover up what actually happens in our day to day operations. As a result the different segments of the industry may consider themselves relatively safe because the ambulance does not appear on the scene very often.

For instance in one type of refrigerating plant there was a general feeling of apathy because no one was aware of great hazards. When a detailed survey was made the accident frequency ran over 90. It gave a quick reason for the fact that a number of plants are bothered by mounting compensation insurance rates.

Identifying the Hazards

For many years refrigeration was wholly produced by ammonia systems. At that time ammonia was considered the primary hazard. Recent fires and explosions in ammonia plants have renewed the earlier apprehensions in some quarters. Yet if statistics were available they would probably show more casualties from workmen falling off the old two or three story A frame machines than there were injuries chargeable to ammonia.

That statement certainly is not made to encourage carelessness with ammonia or ammonia equipment. It is a very strong and irritating gas. Costly and damaging fires or explosions have taken place in ammonia plants. But let us not become obcessed by one segment of the problem, and then be bowled over by some other hazard we were quite content to neglect.

More than 25 years ago when I first had an opportunity to analyze specific data in this field there was a very serious injury to a workman which stuck in my mind. A helper on a machine installation job was told to put a bend in a piece of 1-inch electric conduit. A large motor driven compressor was nearby—closer than the work bench. He stuck the conduit in the base of the idler frame and pushed to put the bend in the tube. A slip threw him into the belt and he was severely injured. Why in the world a man would do anything like that is beyond our comprehension.

It demonstrates two well recognized facts, however. By thoughtless actions many people are able to create hazards where they apparently did not exist before. Also workmen do not recognize hazards until they are trained to be alert to avoid injury.

Code Shows Way

Some of our time in the industrial refrigeration industry has been wasted in arguments about what are the most important sources of injuries. Refrigerants have been compared, machines analyzed and installation methods argued. The Refrigeration Safety Code, B-9.1 has taken much of the wind out of these arguments. The next logical step is cooperation to determine definite accident experience. Then we will be in position to attack our problems on a specific basis.

Basically the problem in our field is to train men to give them a sharp perception of hazards and a general awareness of safe working methods. Past efforts in this field have been individualistic and have emphasized differences rather than the many points of common interest. Each segment of the field has felt it required rather special treatment in the realm of accident prevention. Meanwhile the injury experience is not good.

The specific accident described above involved electric conduit but the injury was caused by a refrigerant compressor drive. There are special electric hazards in the refrigerating field, however. They are related to the damp conditions frequently existing and the brine in use in many plants. A brief summary of the more prominent hazards in some segments of the field would be enlightening.

Handling of goods provides the most prolific source of accidents in Cold Storage plants. In this they parallel other activities such as packers and wholesale groceries. Yet they have numerous accidents, many quite severe in connection with mechanical and electrical equipment and low temperatures.

A majority of the accidents in the Ice Industry occur in connection with the handling of the ice itself. But here again there are far too many injuries in connection with the refrigeration equipment and the electrical sections of the plant.

Presented to the meeting of the Refrigeration Safety Committee, National Safety Congress, 1951.

Dairies and Breweries in most cases are now conducting well coordinated accident prevention programs. Yet some rather notable accidents have occurred in their plants which have involved the refrigerating equipment, low temperatures, or related operations in the plants.

No data is readily available on the experience in other activities employing refrigeration for industrial processing. It may be logical to conclude that their operations parallel the ones mentioned before as far as accidents and injuries are concerned.

The specific items mentioned are not the whole story for all these activities. Traffic hazards are a problem in the ice, bakery, dairy and brewery businesses. The latter two and others also use glass containers which have their own specialized problems. Still others might be mentioned.

Despite the diversity of these problems, all have a common desire to make their refrigeration plants and operations as safe as possible. The most efficient and effective way is to make it a cooperative job with people of like interests. That is a procedure in the best traditions of the great organized safety movement. Experience has amply demonstrated that it will work.

Progress Shown

Progress in this field is already evident to give us encouragement. Not long ago, many who operated industrial refrigeration plants considered relief valves a leaky nuisance. They had a more or less standard practice of screwing a plug in the valve outlets.

High pressure cut-outs were not too generally used in the industrial refrigeration field until relatively recent times in many sections of the country. More plants presently operating need this protection. Such factors are covered in the Refrigeration Safety Code and everyone should promote wider observance of its provisions.

Pressure vessels of uncertain structure and strength have been numerous in the refrigeration field according to Paul Cassidy of the Hartford Inspection Service. (Ice and Refrigeration Aug. 51, pg 34). Convenient methods have been developed and used to check such vessels. By this process the weak ones are being replaced before they make their weaknesses known by failure during use.

The material scarcities during the war period and after have given much greater emphasis to protection of equipment and preventive maintenance programs. Rust and corrosion are no longer permitted to go on unchecked to the extent that was characteristic in so many plants. This process has considerably reduced the potential for breaks and failures in piping and equipment. At the same time the accident potential has been reduced.

Electrical Hazards

The increased electrical hazards in refrigeration plants have been mentioned before. Because of the low voltage usually involved early plants did not give particular attention to the problem. The situation has been receiving more definite attention during recent years. Now adequate grounding methods are followed in all well operated plants. Current carrying lines and parts are properly shielded and regular maintenance keeps the protective measures at full effectiveness.

HAP HAZARD
IT'S GREAT TO BE OFF THE JOB AWAY FROM THEM SAFETY GUYS!
ALWAYS YAMMERIN' AWAY AT ME - BE SAFE - BE CAREFUL - BE CAREFUL - BE SAFE
THEY ACT LIKE I AIN'T DRY BEHIND THE EARS!
NATIONAL SAFETY COUNCIL

From the standpoint of equipment and design industrial refrigeration plants generally have reached a satisfactory standard in regard to safety and accident prevention. The next important and quite logical step is to do a commensurate job in safety training of personnel. Certain plants and companies in the industry have demonstrated the work that can be done in this field, as well as the results it will obtain. Because they know the benefits of cooperation they will undoubtedly make their experience available to all who wish to join with them for wider and more complete safety training in the industry.

Summary

1—Much of the work in the industrial refrigeration field looks simple, easy and safe so we may have a false sense of security.

2—The small size of the average worker unit tends to mask the true situation in regard to accident experience. Also it makes safety work more difficult to organize.

3—Inaction will not solve the problem because people without specific safety training do not automatically adopt safe methods. Frequently they create hazards which did not previously exist.

4—The users of Industrial Refrigeration have a diversity in their activities which presents a variety of problems. All of these should have due attention, and the program of accident prevention should include the refrigeration field along with the others.

5—Much progress has already been made. By and large, equipment and installations are fulfilling the requirements of the Refrigeration Safety Code. Some units in the field have already demonstrated the good results to be obtained through well coordinated effort.

6—The next logical step is a cooperative program of accident prevention embracing a representative group from all phases of the industrial refrigeration field.

Fire Department Inspections Help Reduce Fires

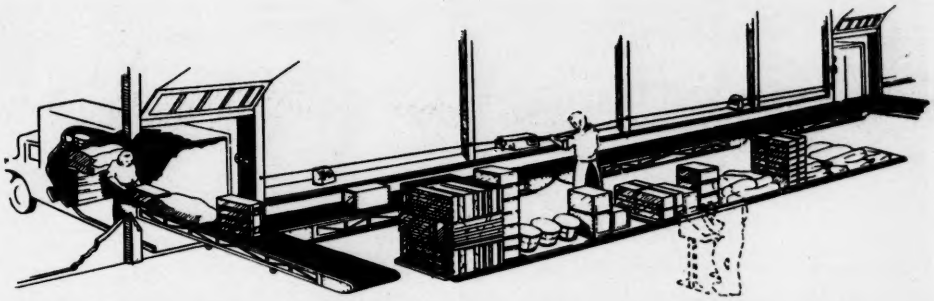
ANNUAL fire department inspections of dwellings have helped to reduce fires, according to a bulletin of the National Board of Fire Underwriters.

In one city a fire department inspection of dwellings reduced the number of dwelling fires by 37 percent and the total dwelling fire loss by 44 percent as compared with the previous fire years, the bulletin reports.

Cities which have had such inspections made, either by regular or volunteer firemen, have found it "worth while to repeat the inspection program annually," states the bulletin.

Dwelling house fires are responsible for about one-half of all lives lost each year by fire in the United States.

Fire losses of all classes increased six percent in the first six months of 1951. The total dollar value of these losses was 387 million dollars.



With new recording system the checker is eliminated from truck loading operations

RECORDING SPEEDS TRUCK LOADING

Method of using voice recording and transcribing equipment in loading of delivery trucks results in elimination of checker, decreasing delays, and reducing loading expense.

A METHOD of using voice recording and transcribing equipment in the loading of delivery trucks was developed and tested in the warehouse of a service wholesaler where two three-man crews previously were used in truck loading operations. The use of this equipment resulted in the elimination of the checker in each crew. Thus, where the checker is one-third of the loading crew, savings amounting to one-third in the labor cost of loading can be effected. Time studies at the test warehouse showed a saving of 80 man-hours per week through the elimination of two checkers,—one on each crew. On the basis of an assumed wage rate of $1.25 per hour, this saving amounted to $100 per week, which in a period of four months will more than pay for the cost of the equipment.

Time studies of operations performed at the warehouses of service wholesalers indicate that the loading of delivery trucks is one of the most costly, on a tonnage or volume basis, of all operations performed. Ordinarily, it is necessary, first, to assemble the merchandise for one truckload from a recapitulation of the individual orders or invoices. A large percentage of the service wholesalers follow the practice of having one man (checker) call the items, one at a time, from the invoices during the actual loading of the truck, while other workers pick up the merchandise, package by package, and stow it on the delivery truck.

While this method of using voice recording and transcribing equipment in the loading of trucks applies particularly to warehousing of a service wholesaler, it should be of interest also to refrigerated warehouses, particularly those handling small lots. It is reviewed here with the thought that many warehousemen may be able to adapt the idea and methods to their individual operations.

By making a recording of the individual items shown on each invoice and playing back the recording during loading the reduction in the size of the crew was accomplished with no decrease in the rate of production. In fact, time-study data showed that the production rate increased after the workers became experienced in using the equipment. The smoother movement of merchandise from assembly areas onto trucks also resulted in savings in man-hours in related phases of warehousing operations and reduced the total elapsed time required to perform the assembly and loading operations, thereby reducing the time the produce was exposed to heat or extreme cold weather conditions.

Although the cost of the custom-built installation at the warehouse where the tests were conducted amounted to slightly over $1,300, this cost does not appear excessive for this warehouse, since the outlay will be recovered in about four months. Generally, service wholesalers who employ only one full-time checker should be able to install such a system at a cost of about $850 and recover its cost in about six months.

Loading Problems

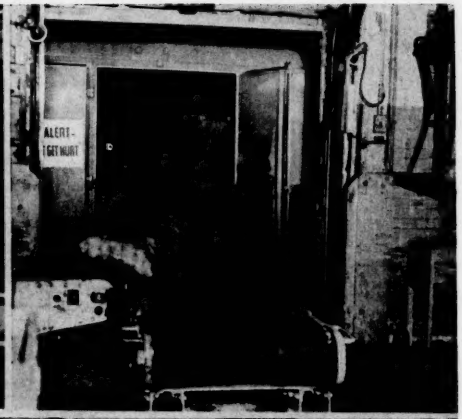
The job of loading trucks from the warehouse involves a number of problems. One of these is that to use certain types of handling equipment most efficiently, it must be possible to take the equipment directly from the floor of the warehouse onto the truck. In a number of facilities this cannot be done because of the difference in the respective heights of the truck-bed and the floor of the warehouse.

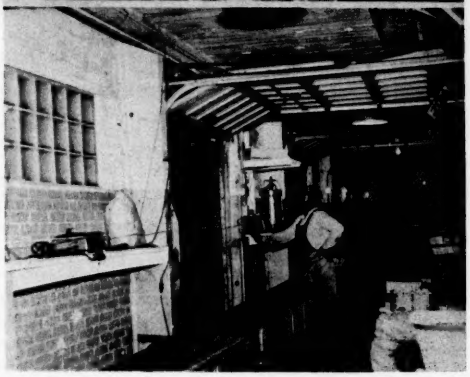
Another problem is that the trucks must be loaded with regard to the order in which deliveries are to be made. That is, items must be loaded in reverse order, so that the driver can unload the items with a minimum of rehandling. Also the truck must be

---

From bulletin issued by Production and Marketing Administration, U. S. Dept. of Agriculture. Prepared by Marvin R. Kercho, industrial specialist; Joseph F. Herrick, Jr., agricultural economist; Stanley W. Burt, industrial specialist.

The study on which this report is based is part of a larger research project covering the handling of various types of packages of farm and food products in stores and warehouses. This is the second of a number of reports to be issued prior to the completion of the project. The project is being financed with funds appropriated under the Research and Marketing Act of 1946.





Pictures show features of the revised loading method

Above, assemblyman deposits a skid load of items which have been picked from stock in conformity with the recap at the assembly point alongside the belt conveyor.

Above right, cantilever belt conveyor, extended into the body of the truck, being fed from one of the reversible lateral belt conveyors. Note 100-pound bag of potatoes being automatically transferred from lateral conveyor to cantilever conveyor.

Right, a worker pulls a cord which moves the arm on the micro-switch, thus completing the circuit to the transcriber and causing the items to be called over the loud speaker.

so loaded that the easily damaged merchandise is not bruised or crushed. All this must be done with expediency and accuracy, since it is essential for good business relations that orders be delivered in good condition and that they be accurately and completely filled.

Recording and Transcribing Method Installed

The use of recording and transcribing equipment was designed to increase the efficiency of truck loading operations. This method, with the necessary equipment, was installed and tested under actual operating conditions. As was done in the original method, the driver-salesmen made up recaps of orders received during the day which was telephoned to the office. Here tonnage was computed for each load or route and items to make up truck loads were dictated into the recording machine which transcribed the directions onto a thin, flexible plastic belt, 3½ inches wide and 12 inches in circumference, called a memobelt. The recording machine was started and stopped by a hand or foot switch. A desk-type microphone was used in recording the necessary information on the memobelt.

One of the steps required is to go through the invoices to make up the split item sheet. The office clerk starts the recording machine and first calls the load number, the truck number, and the total tonnage for the load. This serves to identify the load and gives the loading crew the information they need to do a good job. The items and quantities of each to be loaded are then called, and a split item sheet made up at the same time.

This recording operation requires very little additional time over that required by the original method, since it is done in conjunction with tabulating the split items. In making the recording, the clerk calls for each order the quantity of each item to be placed in the truck; for example, "two potatoes, one cabbage, four lettuce," etc. Any special information concerning an item or order is also recorded before that particular item or invoice is called. The items are recorded in order of loading, that is, the last to be delivered is the first recorded.

After the recording is completed, the clerk writes the load number, truck number, weight, and date on the memobelt and carries it with the recap and invoices to the shipping floor. Time studies indicate that the actual recording of all items for even the heaviest load required no more than five minutes.

The equipment employed in the loading operation is as follows: Motor-driven belt conveyors (as used in original method); two transcribing machines, each serving two loading points; eight speakers, two used at each loading area; two micro-switches, one connected to each transcribing machine; and two finger-touch repeat switches, one connected to each transcribing machine.

Loading Operation

The transcribing machines replace the checker. One worker performs the remaining duties of the checker and also loads items onto the con-

veyor as they are called over the loud speaker. The other worker is stationed in the truck to take the items from the conveyor.

The first worker slips the memobelt into the transcribing machine which has three small dials to adjust volume, tone and speed. The speed control regulates the rate at which the items are called, set faster or slower to conform with the skill of the worker. When the crew is ready to load, it is merely necessary to pull the cord that is strung along the conveyor. This action engages the microswitch located at one end of the cord. The circuit is thus completed and the transcribing machine is started.

The information recorded on the memobelt by the office clerk is then called. When two, three, or four items have been called, the number depending on the quantity of each item and the skill of the worker, the rope is released to stop the machine. When the items that have been called off have been placed on the belt conveyor, the operation is repeated until all items have been loaded.

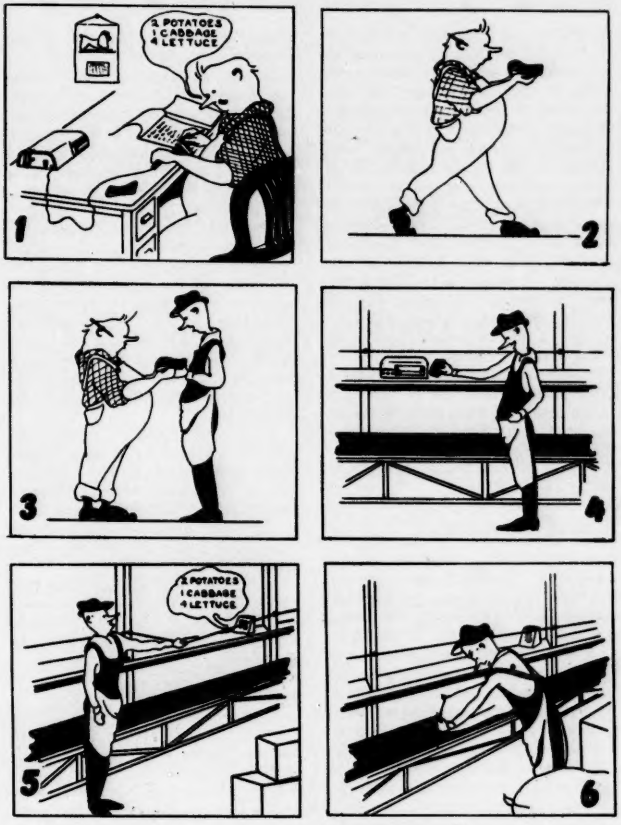
Since the rope extends the entire length of the lateral conveyor, the transcriber can be switched on and off at any point alongside it. Each time the rope is pulled, the transcribing machine immediately resumes operation with the same volume, tone, and speed it had when it was shut off. The reproduction of the recording starts off very sharply and clearly. No time is required for warming up or winding up.

One loud speaker is located at each assembly area so that it can be clearly heard at any point along the loading section of the conveyor. Also, a speaker is directed toward the truck, enabling the loader in the truck to anticipate in advance what produce he is to receive from the loading station for storage. This facilitates better arrangement of the load and results in less damage to the produce.

In the event an item is missed, the worker merely presses a small repeat switch which moves the transcribing machine carriage back over a groove or two on the recording, and pulls the rope to start the machine so as to repeat the item. Throughout the experiment it was found that very little replaying was necessary. As workers become more familiar with the method and equipment and develop greater skill, repeating items should rarely be necessary.

Because of the size and length of this warehouse and the nature of the operations, it was necessary to install more equipment than might ordinarily be needed. In most facilities, less recording and transcribing equipment would be needed. In such cases, the system could be installed for about $850, and, depending on the volume of merchandising moving through the warehouse, should be paid for out of savings in about six months. For example, most warehouses could get along with one transcribing machine instead of two, one pre-amplifier instead of two, four speakers instead of eight, and one stop-start switch instead of two.

The new loading method in a nutshell



1.—*An office clerk records onto a small inexpensive memobelt the items from invoices for truck load.*

2.—*After the recording has been made and properly marked for identification, it is carried to a member of the loading crew.*

3.—*The shipping crew member takes the recording belts and locates the proper load.*

4.—*The belt recording for load is placed in transcribing machine.*

5.—*A rope strung along the loading area is pulled to start transcribing machine. The information contained on the belts comes over small speakers.*

6.—*The man having heard two, three, or four items, proceeds to pick them up and places them onto a belt conveyor, which carries merchandise into truck.*

Low Temperature Workers Honored

USE of liquid helium is the only known method of cooling matter to temperatures below –258 Centigrade, or 15 K. Since these low temperatures are necessary to the success of many experiments on the nuclear structure and force of metals, techniques for liquefying helium are of utmost importance to modern scientific research.

For their invention and development of a machine for liquefying helium, called the Collins Helium Cryostat, a professor at the Massachusetts Institute of Technology and his former graduate student and coworker have been awarded medals by The Franklin Institute.

They are Dr. Samuel C. Collins of Watertown, Massachusetts, recipient of the Institute's John Price Wetherill Medal, and Dr. Howard Oldford McMahon of Lexington, Massachusetts, recipient of the Edward Longstreth Medal.

Awards Announced

Announcement of the awards was made by Dr. Henry B. Allen, executive vice president and secretary of the Institute, who said that the scientists were being honored "in consideration of the invention and subsequent development of the first liquefier of helium to operate without the aid of external refrigerants, an admirably designed, reliable machine which is produced in quantity and has materially increased the number of laboratories and persons engaged in work at ultra low temperatures.

Formal presentation of the medals to Dr. Collins and Dr. McMahon took place at traditional Medal Day ceremonies in the Institute's Franklin Hall on October 17.

The history of helium in research and industry is a relatively brief one. First recognized in 1868 from a brilliant yellow line in the spectrum of the chromosphere of the sun during a total eclipse, helium was not found on the earth until 1895 as a constituent of the mineral cleveite, a uranium thorium mineral. It was first liquefied in 1908 in Holland by Kammerlingh Onnes. During World War I helium was used to fill lighter-than-air balloons. And it is for such uses that it is, perhaps, best known to the general public, although its less publicized scientific uses have an immeasurably wider scope.

Following the work done in Holland, the next establishment to liquify helium was set up in Toronto, Ontario, in 1923, when McLennan and Shrum built a hydrogen and helium liquefier from Onnes' drawings.

In 1938, an exhibit of liquid helium was one of the attractions at a meeting of American and Canadian physicists at the University of Toronto. Up to that time, very few physicists had ever seen it, as helium was being liquefied in only a score of laboratories in the world.

Since that time, however, great interest has developed in the extraordinary phenomena and properties of matter at temperatures near the absolute zero. However, as temperatures below –258 C (15 K) can be attained only by the use of liquid helium, development of an improved liquefier of helium was of utmost importance if such studies were to be carried on.

The Collins Helium Cryostat, developed within the past decade, produces liquid helium by driving an engine to do external work, precooling the oncoming stream in a heat exchanger with the discharge from the engine, and finally employing the cooling Joule-Thomson effect.

As of August, 1951, 37 of these machines had been installed in laboratories in the United States, Canada and Europe, and four more were being built.

Liquid Helium Available

Dr. Allen, in announcing the awards, stated that the Collins Helium Cryostat has made liquid helium available to many scientists who would not otherwise have been able to experiment at these low temperatures, and that it is considered the most important contribution to cryogenic technique—the making of low temperatures—since the original liquefaction of helium by Kammerlingh Onnes in 1908. Previous to its development, workers with liquid helium were obliged to build their own liquefiers. Dr. Collins and his former graduate student and coworker Dr. McMahon have together developed a liquefier that is being produced in quantity and at moderate cost. It can be delivered to a laboratory, set up in a room of moderate size and put into operation in less than a week.

Dr. Collins, inventor of the machine, was born in Democrat, Kentucky, in 1898. After taking his B S.A. degree and his M.S. degree at the University of Tennessee, he received his Ph.D. in chemistry in 1927 from the University of North Carolina. While still working for his doctor's degree, he taught chemistry at Carson-Newman College and was an instructor of physics at the University of North Carolina. He later taught at Tennessee Junior College and Tennessee State Teachers College. In 1930 he joined the staff of the Massachusetts Institute of Technology, where he is now a professor in the department of mechanical engineering.

Dr. McMahon, a former student of Professor Collins, and his co-worker in the development of the Cryostat, was born in Killam, Alberta, Canada, in 1914. He received a B.A. degree from the University of British Columbia in Vancouver in 1935, and subsequently took his Ph.D. in physical chemistry at the Massachusetts Institute of Technology, where he began his work with Professor Collins. He was a research associate in physical chemistry at M.I.T. in 1941 and 1942, and since that time has been affiliated with Arthur D. Little, Inc., in Boston, the manufacturers of the Helium Cryostat.

Ice Cream Production

AUGUST ice cream production in the United States, estimated at 64,595,000 gallons, was four percent larger than the production of August a year ago, but was five percent smaller than the 5-year, 1945-49, average for the month, the Bureau of Agricultural Economics reports. Production declined two per cent between July and August, compared with a fractional upturn a year ago and an average drop of seven percent between these months during the 1945-49 period.

In the first eight months of 1951, production was up three percent from the same period of 1950 but was down five percent from the 1945-49 average for these months. The buterfat content of ice cream made in August averaged 12.1 per cent for the country as a whole, the same as for July and also the same as for ice cream made in August last year.

Increased production from August last year was indicated in all regions except the East North Central where the decrease was one percent. The gains ranged from one percent in the Pacific States to 17 percent in the South Central. The remaining increases were three percent in the North Atlantic, four percent in the South Atlantic, six percent in the West North Central, and eight percent in the Mountain States. In the three leading ice cream-producing states, output was up nine percent from August, 1950 in Pennsylvania, up three percent in New York, and up two percent in California.

THE ICE INDUSTRY

NATIONAL ASSOCIATION OF ICE INDUSTRIES

Executive Offices
1706 L St. N. W., Washington 6, D. C.

Executive Secretary
Guy W. Jacobs, Washington, D. C.

President
H. O. McLain, Chicago, Ill.

First Vice-president
E. F. Condon, Los Angeles, Calif.

Second Vice-president
Wm. J. Ayers, Memphis, Tenn.

Treasurer
Geo. Steers, Jr., Kalamazoo, Mich.

THIS MONTH IN BRIEF

The annual convention of the National Association of Ice Industries will open in Houston, Texas November 13. Feature address will be delivered at the closing session Friday by Senator Karl E. Mundt of South Dakota. Business sessions will be full of interest as usual and a full array of ice supplies and equipment will be exhibited.

Consumers buy and eat more sweet corn when it is iced, and they are willing to pay more for it. This was shown as a result of a two-year research project at Ohio State University, sponsored by the Ohio and National Associations of Ice Industries.

A Missouri ice plant, adopting a progressive program, has changed a medium-sized ice plant to a large and varied operation including ice service, frozen food lockers, and commercial freezing service.

A diversified refrigeration and other services is provided by the Hubbard Ice & Fuel Co. a long established concern in Cedar Rapids, Iowa. Besides ice service the company provides refrigerated storage, fuel oil and dairy products.

Ice Show Ready to Open In Texas—November 13

THE feature address at the 34th annual convention of the National Association of Ice Industries at The Shamrock, Houston, Texas—November 13-16 will be Senator Karl E. Mundt (Rep. S.D.). This popular, freedom-loving statesman will make the closing speech on the Friday program. The title of his spirited remarks: "Have Faith in Freedom."

Senator Karl E. Mundt
Feature Speaker at National Ice Convention

Reports and comments on the Texas meeting coming in to the Washington office indicate a growing interest on the part of icemen to make this the most important get-together in years. A strong attendance is promised by the number of reservations made at The Shamrock alone.

Texas Icemen appear to be turning out in full force. After September 15th The Shamrock was deluged with reservations from the Lone Star State. Yet, there are a considerable number of rooms available for everyone who plans to attend the ice meeting. Good accommodations to suit all needs are in the offing for those who write to the hotel as soon as possible.

Harold O. McLain NAII president, one of the most able speakers in the country, will ignite the imagination and spirit of icemen with his eloquence at the opening session Tuesday. The title of his talk bespeaks a challenge to all: "On Guard!"

Immediately after the invocation, convention-goers will be greeted by General P. A. Weatherred, Executive Secretary of the Southwestern Ice Manufacturers' Association. Other important comments are to come from Guy W. Jacobs, NAII executive secretary; George Steers, Treasurer; and Jacob Irvine, Director-at-large. Mr. McLain's address will follow.

The NAII Research Department has uncovered a source of new ice tonnage that promises to be a milestone in progress. "We have really hit the jackpot" exclaims R. W. "Prof" Davis of The Union Ice Company, San Francisco, Calif. He makes reference to the results of a study made at the University of California on the icing of fresh meat. His report, on Wednesday, according to C. P. Austin, Director of Research and Engineering, should be one of the high spots of the entire meeting. A poultry icing project recently completed at the same university will also be aired and that, too, will breathe encouragement into all present. Research and engineering progress and a report on the coming year's activities will round out that part of the program.

Also at the Wednesday session, Harold Liebenthal, chief counsel OPA will reconstruct the Washington attitude and explain ramifications of controls during a defense economy.

Unit Secretaries

The Unit Association secretaries will hold their usual annual meeting in the Shamrock Hotel Tuesday morning, followed by a group luncheon.

Merchandising Forum

This year, for the first time, merchandising will get the full attention it deserves. Icemen need it . . . want it . . . On Thursday they'll get it. A

full session will be devoted to learning how to boost volume sales of all kinds of Ice. Paul H. Andres, the moderator, is truly a "ball of fire" when it comes to sparking an audience to warm up to the subject.

Following the previous day's research program, the merchandising forum will show ways and means of capitalizing on the information the industry is now armed with to sell more Ice. "Pete" promises to lay the facts on the line; pull no punches. It's going to be a lively session that, according to "Pete," will "lift Icemen out of their lethargy and inspire them to be more aware of new fields to conquer!" The meeting will move right along with selected speakers who have made profitable accomplishments in various Ice sales.

New Public Relations Approach

As each day's meeting builds up and conditions icemen for the year ahead, the Public Relations Department's program on Friday will maintain the fast pace. E. L. "Pop" Gunn, the opening speaker will report on Advertising accomplishments of 1951. His speech will pack a wallop in that things will be done differently this coming year.

Then comes the "frosting on the cake." Friday's session should be unforgettable because of the array of speakers, one right after the other. To close the Public Relations part of the program, nationally prominent Robert M. Feemster, chairman of the Executive Committee of the Dow-Jones Publishing Co., Inc., will take a publisher's look at our publicity activities. (Dow-Jones publishes *The Wall Street Journal.*) To learn how we look from the other side of the desk, for advice on maintaining better customer relations, for more knowledge of Public Relations and its place in big industry, see and hear Robert Feemster.

Convention Climax

Icemen who have wondered how things would be if they had gone into another business, will want to hear Paul E. Belcher, vice-president and cashier of the First National Bank of Akron. His talk, "A Banker Looks At the Ice Business," should give a new perspective for the present and future. A young, rather phenominal executive, his analysis of current business and forecasts has received national recognition.

A fitting climax of the four-day parley will be the introduction of Senator Karl E. Mundt. Very much in the news these days, Senator Mundt will continue his fight for free enterprise at the ice convention.

Convention Entertainment

Two nights of unforgetable entertainment and excellent meals are planned for convention-goers. One is a rather unique get-together and the other the evening of fun and frolic in the main ball room in the form of a banquet and floor show.

On the first evening of the convention there will be a big "splash" of entertainment, and for the first time it will be held outdoors. An aquacade of beautiful bathing girls has been engaged to perform for ice folks. The hotel promises a delicious "Shamburger Party" by the Shamrock Pool.

The group of young lovelies are called the Corkettes, and are sponsored by members of the private Cork Club of The Shamrock. Although amateurs, the Corkettes have performed before a variety of organizations in Houston.

Food served in exotic surroundings by the pool will consist of the now famous Shamrock hamburger, called the "Shamburger"—with appropriate delectable trimmings. A special rate per plate has been arranged with the hotel Maitre d' which should please everyone.

On Thursday an evening of lavish entertainment can be expected. Icemen, their wives and guests take over the Emerald Room for a banquet and floor show. Singer Frankie Laine, currently the talk of the entertainment world, a renowned band, and a galaxy of star-studded acts promise a gay time for all. The orchestra will be there for dancing to the wee morning hours.

In the planning stage now is a bus trip to the famous San Jacinto Memorial grounds Wednesday afternoon. The visit would also include an opportunity to board the battleship Texas and have dinner at a favorite seafood restaurant. Special arrangements are under way to make this experience available to convention guests.

Medium-Weight Clothing

Experts on the Houston climate suggest that icemen and their wives take along clothing of the not-too-heavy-yet-not-too-light variety for convention wear.

Suits of gabardine or similar weight are recommended for general daytime use, plus a light topcoat for the cool evenings. Shamrock representatives advise water-lovers to bring along swimming togs; the weather might permit a dip in America's largest pool.

Convention Exhibits

With a month remaining for additional registrations, 26 leading suppliers of ice industry equipment had taken booth space at the 1951 national ice convention. An interesting and informative array of exhibits —one that every iceman should see —is guaranteed. As of the middle of October, the following firms were registered as exhibitors:

Bateman Foundry and Machine Co., Inc., Mineral Wells, Texas (Ice crushers and vending stations).

Ballard Sales Co., Fort Worth, Tex. (Ice vendors, cubers, and slingers).

Sam Bonart Uniforms, Inc., New Orleans, La.

F. B. Dickinson and Co., Des Moines, Iowa (Vending equipment).

Gifford-Wood Co., Hudson, N. Y. (Cubers, sizers, and tools)

Frick Company, Waynesboro, Pa. (Ice-making machinery).

Ice Cooling Appliance Corp., Morrison, Ill. (Refrigerators).

Ice Plant Equipment Co., Inc., Philadelphia (Ice picks, tongs, and other supplies).

Index Coupon and Supply Co., LaPorte, Ind. (Coupon books, ice picks, tongs, and chests).

Knickerbocker Stamping Co., Parkersburg, W. Va. (Ice cans).

The Lilly Company, Memphis (Ice sizing equipment).

Jos. A. Martocello and Co., Philadelphia (Miscellaneous ice-making supplies).

National Rejectors, Inc., St. Louis (Coin mechanisms).

The Ohio Galvanizing and Mfg. Co., Niles, Ohio (Ice cans).

Pittsburgh Waterproof Co., Pittsburgh (Canvas bags).

Progress Refrigerator Co., Louisville (Refrigerators and chests).

Rex Engineering & Sales Co., Oklahoma City (Water treatment equipment).

Thermo Cuber Co., Chicago (Vending equipment).

Trusty Manufacturers, Inc., La Porte, Ind. (Display cases).

Union Bag and Paper Corp., New York City (Wet strength bags).

Vivian Manufacturing Co., St. Louis (Tongs, bags, chests and other supplies).

York Corporation, York, Pa. (Ice-making equipment).

Double Seal Ring Co., Fort Worth, Texas (Rings).

Hall Machine Shop, New Smyrna Beach, Fla. (Ice-making equipment).

Safety Seal Piston Ring Co., Fort Worth, Texas (Rings).

Shipper's Equipment Mfg. Co., Pharr, Tex. (Crushers and slingers).

CORN ICING PRODUCES PROFITS

Research study in Ohio shows that consumers buy more sweet corn when it is iced and are willing to pay more for it. Improved marketing methods are developed

CONSUMERS buy and eat more corn when it's iced. What's more, they are willing to pay more for it. These are the findings of one year's work on a two-year research project at Ohio State University. The investigation confirms the value of improved handling procedures for sweet corn which moves only short distances to market. A bulletin issued by the Ohio Association of Ice Industries describes this work with pictures showing various phases of the corn icing process.

The project was sponsored by the Ohio and the National Association of Ice Industries with the cooperation of a large retail food chain and a prominent vegetable grower in the Columbus, Ohio, area. The main objective of the study was to develop improved marketing methods for corn which is consumed near the point of production.

New Packaging Idea

Emphasis was placed on an entirely new idea for packaging and refrigerating the product. As the corn was harvested, it was packaged and iced in wet strength paper bags. The bags were identical to those used by ice companies for delivery of prepared ice. The corn was packed in the field to avoid loss of quality or nutritive value. Four dozen ears of corn and 20 pounds of ice went into each bag.

The procedure consisted in placing two dozen ears of corn in the bag and covering it with a layer of 10 pounds of crushed ice. This was followed by another two dozen ears and another 10 pounds of ice. The bags were closed and tied. Each bag was kept in a vertical position so that the ice and water would trickle through the corn and do an effective job of keeping it cool and moist.

Iced and un-iced corn were moved through identical channels of distribution. The corn which was packaged in wet strength paper bags and iced at the farm was sold through six retail stores, three of which were equipped with iced displays. The corn in the other three stores was displayed in mechanically refrigerated produce cases.

Corn marketed in the usual manner was also studied. This corn was not iced in the field nor refrigerated in the store. It was distributed through three units of the same chain which was used for refrigerated corn. These check stores, however, were equipped with dry produce racks.

Icing Boosts Sales

Records were kept on condition, spoilage, markdowns, costs, volume of sales, etc. for both iced and un-iced corn. Sales of corn iced from farm to display case were much greater than sales for corn which was iced at the farm and displayed in mechanical cases. Sales of corn which had not been refrigerated at all were lowest of all.

Volume ranged from 146 to 181 dozen per week when ice was used in the field and in the store. In the three stores which were equipped with mechanical cases in which corn was displayed which had been iced in the field, sales ranged from 92 to 171 dozen a week. Stores which made use of dry racks and offered corn which had not been iced by the grower were far behind with only 47 to 79 dozen per week.

As the season advanced and corn sales slumped, sales of the iced corn declined only slightly compared to the other methods of handling. Sales were off in all stores during the last two weeks of the investigation. During this time, however, stores which were using ice were only about 8 per cent below the previous two weeks, as compared to a 27 per cent decline of sales for stores with mechanical cases and a 30 per cent drop for the dry rack stores.

Ice Consumption

During the entire test, an average of 4.51 pounds of ice was used per dozen when the corn was packed. At the local rate for ice, this cost amounted to 2.26 cents per dozen.

For display of the corn in retail stores using iced displays, the average amount of ice used was 2.1 pounds

After the corn is harvested the ears are trimmed, placed in wet strength paper bags and then iced with crushed ice.

per dozen. At the local price of 70 cents per hundred pounds, the cost was 2.25 cents per dozen. Actually, there was a great deal of variation in the amount of ice used between stores. This ranged from as low as 1.9 pounds per dozen to as high as 4.88 pounds per dozen.

Since the average temperature of the corn in the store using the least amount of ice was not significantly higher than that of the store using the greater amount of ice, it would seem to indicate that icing costs in the store could have been significantly reduced by more efficient use of ice. Also temperatures of the corn at the end of 24 hours would indicate that perhaps additional ice or hydrocooling at the farm would have provided more adequate protection of the commodity.

Complete cost records were not compiled on mechanically refrigerated cases. Power costs figured from .06 to .08 cents per dozen. Depreciation and maintenance costs which constitute significant items were not computed.

The wet strength paper bag which was used cost the grower 5.85 cents f.o.b. Cincinnati. It was generally agreed by those interested in this project that a bag which would hold 5 dozen ears and 25 pounds of ice would be a more desirable size inasmuch as 5 dozen is the standard pack in the area studied. Such a bag probably would cost 7 or 8 cents.

Container Costs

A comparison of container costs, of course, would depend on the type of container which is being used. In most cases the bag will be less expensive than new corn crates and will be roughly the same price of second-hand crates. The bag was found to be a very satisfactory package and it provided some insulation. Having the chilling agent in the package makes it possible to divide lots in the wholesale market or chain store warehouse without losing the refrigeration.

The report states that the costs of bags and ice should not be considered as entirely new costs. Containers are required for the corn regardless of refrigeration. The corn sold in the check stores often had additional cost not experienced in the stores selling the high quality corn, such as stripping, and packaging in transparent bags in order to stimulate sales. The costs of transparent bags per dozen (usually six ears to the bag) plus the labor may have been equal to or have exceeded the extra cost of handling the high quality corn in stores using iced displays.

Spoilage and throw-out losses were lowest in stores equipped with iced displays. The proportion of corn marked down in price was slightly greater in stores using iced displays and refrigerated cases than in the check stores. This was believed to be due to emphasis being placed on selling all the high quality corn the day following the harvest.

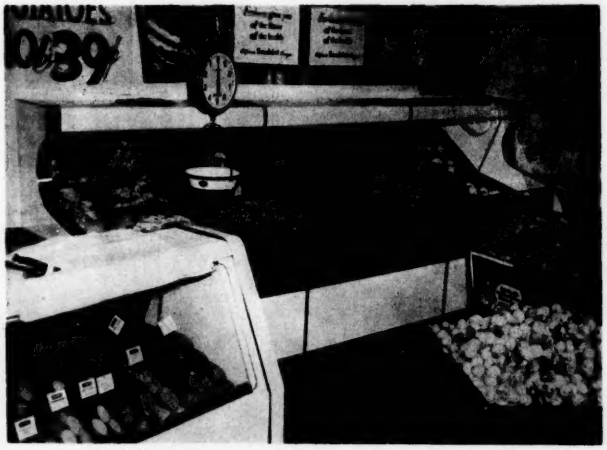
During three weeks of the study, the same prices were charged for iced corn as for corn handled by check stores. For another two weeks, corn was sold in five of the six stores selling iced corn at five cents above the check stores. A six-cent differential was used in the stores selling iced corn during the last week of the study. This is very significant, because of the volume purchased from the iced displays was much larger than the check stores even at the premium price.

For the five-week test period, the stores using iced displays realized gross profits of $55.05 after paying icing costs. The stores using mechanically refrigerated cases for displaying corn which had been iced at the farm had gross profits of $59.46, after power costs, but without any depreciation or maintenance of the cases. The check stores grossed only $31.11. In addition to the inadequacy of the cost figures for the mechanical units, the figures probably understate the true profit position of both the iced and refrigerated cases since a 5 cent premium was paid to the grower during the entire period of the study and no premium was charged the consumer until the last two weeks.

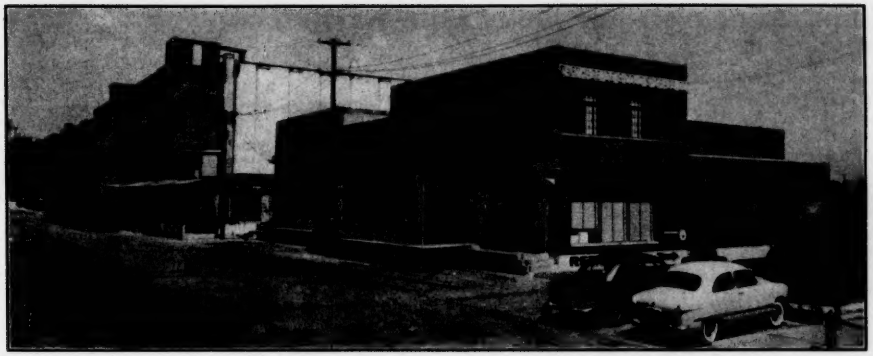
St. Louis Food Store Installs Modern Iced Vegetable Counter

AN iced vegetable counter occupied a prominent place in the new super market opened September 6 by Cook's Markets at California and Shenandoah, St. Louis. Cook's Markets are operated by Chester H. Cook and his four sons, Harold, Chester C., Robert and Walter. The icing equipment was sold to them by the Merchants Ice & Coal Company. Two counters were installed; one 10 feet and the other 15 feet long.

Walter Cook who is in charge of the new store says they have been using ice on their vegetables for several years at their other two stores. He says they believe in ice and while their other installations at 1801 Lafayette Avenue and 4065 Shaw Avenue are converted mechanical cases, they had no other thought except to install cases made especially for ice usage ever since they began planning the new store. They have found that ice gives vegetables eye appeal, practically eliminates shrinkage and keeps it in that garden fresh salable condition. They like the ice idea.



Iced vegetable counter in new super market of Cook's Markets, St. Louis, Mo.



Missouri Ice Plant Adds Service to Provide Community Refrigeration Center

THE Carthage Ice & Cold Storage Company, Carthage, Mo., has become one of the outstanding community refrigeration centers in the Middle West. The business was established in 1890, and until 1927 was owned by Anheuser-Busch. At that time the plant was acquired by H. A. Spradling and C. K. Rowland.

A highly progressive program has changed a medium-sized ice plant to a large and varied operation. Starting with two 10 by 10 Frick machines, the plant now also has an 8 by 8, a 9 by 9, two 11½ x 8's, three 11 by 10's, and a 15 by 10. Three of these machines are of course boosters.

The total ice-making capacity at present is 110 tons per day. Of this, considerable amounts are used for car icing and in icing trucks. The company operates eight ice routes in Carthage and the surrounding areas, and ten country routes.

The locker plant has 2800 compartments, all of which stay rented! Processing equipment is available for handling all the foods entering the lockers, and a special blast freezer is used for cooling them before they are placed in storage.

Other Facilities

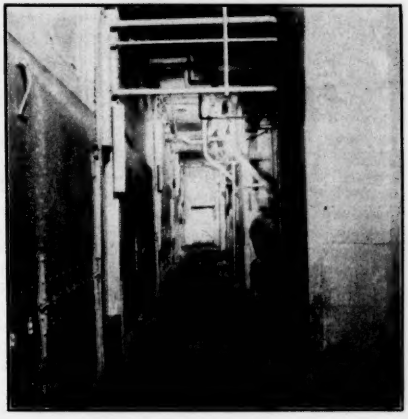
Other facilities provide for the freezing and storage in quantity by individuals of such products as frozen eggs, butter, apples, strawberries, boysenberries, blackberries, beans, spinach, poultry, packing house products, cheese, shell eggs, and evaporated milk. The cold storages handle in a typical year between 12 and 15 thousand tons of products. The plant quick-freezes 200,000 pounds a day.

The breaking and freezing of eggs has been a highly important operation at Carthage since 1935. Handled under contract with the egg division of Standard Brands, this work now totals from seven to 10 million pounds per season. The eggs are broken by trained women, and are placed in 10 and 30-pound cans before entering the blast-air freezers. A battery of five new freezers, each capable of handling 40,000 pounds of liquid eggs a day, has been installed.

These freezers operate at minus 20 F. Each is equipped with three double-nested pipe coils and a float control, with electric valve and by-pass. Each bank of coils has a 16-in. horizontal accumulator. Each cell is equipped with three American

(Continued on page 60)

Above: The refrigerating machine room at Carthage includes six Frick booster compressors and four second stage units.



Right: The five new quick freezing cells each handle 40,000 pounds of liquid eggs per day.

Home Economists See Ice at Convention

AGAIN this year the National Association of Ice Industries was represented at the annual Home Economics Convention, with excellent results. Thousands of home economists, newspaper and magazine food editors flocked to the Public Auditorium, Cleveland, Ohio, during the period June 19-22 for the most up-to-date news of what's going on in the Home Economics field.

Important people visited the ice booth at the Home Economics convention to sample home made ice cream. In the usual order, above, are Maxine Livingston, food editor of Parent's Magazine; Dorothy Kirk, food editor of Womans' Home Companion; Mary Asprey, booth assistant; Stewart Saunderson, City Products Corporation, who, along with Elmer Moffet of City Products, rendered valuable help at the booth; and unidentified home economist visitors.

The ice booth, well-located for maximum traffic was a real "stopper." The reason: ice cream made the old-fashioned way!

Planned by Mary Pentland

Supervised by Mary Pentland, Public Relations Counsel of New York, close to 1,000 visitors registered. Many asked for ice literature such as "Money Saving Tips on Marketing, and 150 requests came for showing the film, "Naturally Yours." At least half of those who filled out the ice registration form noted that they had seen the ice industry film.

Through the cooperation of the Progress Refrigerator Company's Louis Cloud, several ice cream freezers were made available. Twenty-two gallons of ice cream were served in ice cream cones.

On exhibit were an ice refrigerator, beverage chest, ice cream freezers, an ice punch bowl, placards of recent publicity in McCall's and Woman's Home Companion and beautiful corsages on ice. The latter proved most effective as an indicator of how ice preserves highly perishable floral pieces. On the last day, they were raffled off to guests.

Here's what Mary Pentland has to say about the flowers: "The florist put the corsages in clear cellophane bags. I punched a small hole (about an inch long) on the under side of ited the booth he couldn't believe his eyes! Even the most perishable remained fresh for the entire period of the exhibit. Water-proof ribbons were used which eliminated dripping when the winners were pinning them on.

Florists Interested

"Friday several florists stated they wanted to talk with the ice industry people about the possibility of developing some kind of crushed ice for storage, particularly for corsages. Ice seemed to be the answer to preserving corsages in quantity during holidays such as Easter, Christmas, Mother's Day and for graduation times. Florists felt that this would eliminate the rush and spread work over a week instead of making up each corsage on order. Price could then be lowered and greater volume realized."

New Regulation Covers Seasonal Ice Prices

The Office of Price Stabilization has issued Amendment 1 to Supplementary Regulation 45, effective September 24. This Amendment permits ice companies that customarily follow price differential patterns during winter months to return automatically to their regular summer schedules in the spring subject to certain requirements. It is recognized that Amendment 1 is limited in its usefulness to a relatively small percentage of the Industry, but where applicable, it is important.

SR 45 contains six sections, Section 3 stipulating the requirements that must be met in applying for price adjustments. Amendment 1 contains one section which, when added to the six in SR 45, becomes Section 7.

Provisions

The following covers, in brief, the provisions of the new regulations.

1—Any ice company caught by GCPR with lower prices on January 25, 1951, than it had prior to December 1950, may use Amendment 1 to automatically re-establish these prices.

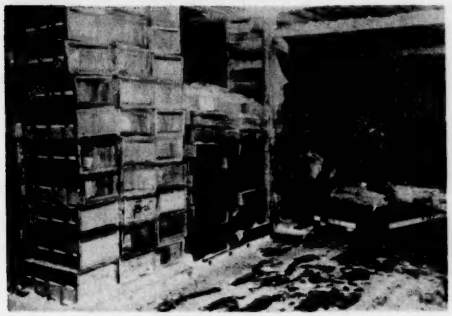
2—Any ice company that already has received an adjustment of its prices, pursuant to SR 45, need not use Amendment 1. Newly approved ceiling prices having been set, the company may, of course, sell under them at any time it chooses; or, it may likewise change them upward so long as they do not exceed the ceiling prices granted by SR 45.

3—Even though an ice company has filed an application pursuant to SR 45 seeking the establishment of new ceiling prices above those prevailing in 1950, it is authorized, subsequent to September 24, 1951, to proceed immediately, regardless of the outcome of said application, to re-establish its pre-winter prices in the spring provided, in doing so, the increases and decreases correspond to those prevailing in the corresponding months of 1950. This rule is explained in the second paragraph of Section 7.

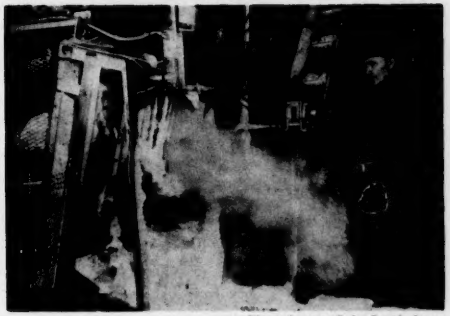
Edward Kenney Joins Metropolitan Ice

EDWARD KENNEY, for thirty years with the Boston Ice Company, in recent years as sales manager, has joined the Metropolitan Ice Company of Somerville. Mr. Kenney will be in charge of institutional sales. The company sells processed ice in varying sizes as well as ice cubes by the bag.

Iowa Ice Company Provides Diversified Refrigeration and Other Services



Cold storage room of the Hubbard Ice and Fuel Company. The three-story cold storage plant is used for commercial goods such as frozen foods at 20 degrees below zero. The two men in the picture are Leo Wasendorf, the foreman, left, and William Callan.



Photos Courtesy Cedar Rapids Gazette

Ice cube machine at Hubbard's saws ice cubes from 400-pound blocks of ice. The cubes fall into a bin, are picked up by a conveyor and carried away to be packaged. In the photo, Joe Jasa, dock foreman, checks the cubes in the conveyor.

As one of a series of feature stories on business concerns, the Cedar Rapids (Iowa) Gazette recently told about the operations of The Hubbard Ice & Fuel Co., operated by the Chadima family. This family, the story explained, now the second generation, has been in business in Cedar Rapids for more than half a century —since 1898. It is now engaged in the ice business, the dairy business, cold storage, farm products, fuel oil and lockers.

Founded in 1898

Forerunner of the present companies was the Chadima Ice Company, formed in 1898 by Joseph T. Chadima. The company's first ice house was next to the river at Penn Avenue. In those days, of course, ice for the city's iceboxes was harvested from the river in the winter, stored and sold in the summer. The company's second ice house was built along the river at L Avenue.

In 1922 the Chadima company and the Hubbard Ice Company were merged, with Chadima management and the Hubbard name. The Hubbard company, which installed the first artificial ice machine in Cedar Rapids in 1915, had been in operation since 1870.

The merged companies were located at First Street and K Avenue N. W., the present location. The company continued to sell both types of ice until the early 1930's, with the natural ice business decreasing steadily and the artificial ice business just as steadily increasing.

It also was in the early 30's that the company began its expansion into other lines of endeavor. Expansion into the fuel oil and oil burner business made it the Hubbard Ice and Fuel Company in 1931. In 1941 a three-story cold storage building was added to the ice plant. Then, in order, came formation of the Iowa Farm Products Company, to deal in wholesale dairy products, and purchase of the Searles dairy. The dairy's east side plant was abandoned when a new one was constructed at the rear of the ice company's office building on First Street N. W.

Company Officers

Present officers of the Chadima companies are Harry, Lester, Willard and George Chadima, sons of the founder. The companies employ about 75 persons, and there are four main buildings on the Chadima property.

There is the ice plant and cold storage building, covering about 30,000 square feet of ground space. In addition to the refrigerating equipment there is a 200 ton ice tank with a daily output of 100 tons, ice storage space and three floors of cold storage space.

There's no locker space in the cold storage plant. It consists of large rooms for storage of commercial goods, such as frozen foods. The temperature is kept at minus 20F.

Next door across the driveway is the office and retail sales building. Directly behind the office building is a garage for company trucks, and behind that it the new building which houses the dairy and the farm products company.

On the other side of the property, behind the ice plant, are the nine tanks which can store up to 450,000 gallons of fuel oil. At the back of the lot is a warehouse building.

The dairy, in addition to processing and selling the normal run of dairy products, turns out dried milk in large containers for commercial purposes.

Serves Large Territory

Both the dairy and the ice business reach out beyond the city limits to other towns within a 40-mile radius of Cedar Rapids. Ice is distributed through ice stations operated on a lease basis, mostly at service stations.

A recent addition to the ice plant is a coin-operated vending machine—first of its kind in Cedar Rapids. It delivers 25 and 50-pound blocks of ice and packages of cubes and crushed ice.

A crusher-blower is used to ice fresh vegetable trucks.

Canadian Ice Season Reported Favorable

MONTREAL ice manufacturers and dealers report an improved trade condition in September over that which prevailed in the spring and summer months. Lack of any long-continued hot spells of weather in July and August, coupled with unseasonal spring conditions for the ice business account for the situation, say heads of production and distribution of ice companies in the metropolitan area.

One of the bright spots this season has been the increased demand for cube and crushed ice. Hotels, notably the smaller ones, were good buyers of both grades. Restaurants, nightclubs and cafes generally stepped-up consumption. Grocers in produce lines, bakeries and private homes appear to have been in the market for a generally acceptable demand in this particular.

Services to railways are said to be quite as good from the consumption angle of both natural and manufactured ice as it was last season. To the large hotels and in some instances to units which have their own refrigeration plants, summer business was not a feature.

Artificial and natural ice deliveries have more than held their own in competition with mechanical refrigeration in the retail trade, both by the hundredweight as well as cube and crushed types. The level here has been maintained favorably more by reason of credit restrictions in purchasing such mechanical units than the price differential. The fact that the purchaser of mechanical refrigerators must meet a 50 percent down payment, balance in 12 months has, in many instances, very much cut sales for these refrigerating units.

Consensus is that while this summer and fall business, both retail and wholesale, is as good as 1949 and 1950 seasons, the market tends toward being over-supplied in the categories of natural and artificial ice. This situation has resulted in the maintenance of low prices in the face of mounting production costs. In this direction, labor and service demands in general account for the unfavorable balance. Power and water, on the other hand, have brought no unfavorable conditions in this regard.

Demand by the dairy industry for about all grades of ice is reported as very good this September and well up to average during July and August. Some dealers say that customer demand in September and the first fortnight in October is up about 25 percent in over-all trade.

Peddler Business

The peddler business for both natural and manufactured ice is reported to have been constant for the summer months. A slight falling off is reported in this trade for October.

Dealers and manufacturers say that there is a distinct trend in the Montreal district away from natural ice in the direction of the manufactured product. The cost of ice-harvesting today, they said, is forcing the gradual disappearance of this manner of production in the demands of greatly increasing labor factors. A further reason in this particular seems to point to the lessened desire on the part of consumers in general to buy natural ice for hygenic reasons. This being the case, ice marketers here are looking for a gradual disappearance of natural ice except for certain purposes.

Glacier Ice Studied By Research Group

A NOVELTY in ice circles arrived in Seattle this September—this being over a ton of the world's most cultured ice, or 2,514 pounds of ice crystals chipped delicately from the Mendenhall Glacier, north of Juneau, packed in 87 cartons and shipped to the Puget Sound port via the S/S Aleutian. Shippers up north packed and handled the ice on its way south as delicately as they'd treat the rarest orchids. The crystals were nestled protectively into cartons and freight-handlers were warned not to drop the fragile loads. The cartons were stored at uniform temperature aboard boat, and at Seattle were held in a Seattle cold storage house.

These ice crystals from the glacier were collected by Dr. Henri Bader, research scientist, were taken over in Seattle by the U. S. Corps of Engineers there, and will be eventually consigned to the Engineers' Snow, Ice & Permafrost Research Establishment in West Wilmette, Ill.

Canada Publicizes Ice for Relishes

TWENTY-SEVEN Canadian daily newspapers that previously have been carrying the Canadian Ice Foundation advertising are being supplied with a special news item "New Wrinkle for Relishes" with the picture reproduced below. It is expected that this unusual ice feature will appear on the women's pages.

The following copy appears under the picture:

"The central interest of this shimmering display of bright radish roses and shining black olives is a mold of crushed ice encircling the celery. It's an inspiration for hostesses on the lookout for something new to

The publicity and public relations work of the association is continually being broadened and expanded in order to reinforce the regular promotional programs for the purpose of keeping the public, not only ice conscious, but to demonstrate on many glamorize the dinner or luncheon service or for the snack bar. The ice mold is made simply by packing ice in a deep bowl or sauce pan in the center of which has first been placed an inverted tumbler. Ice will form into a solid wall."

Reports from Unit Ice Associations

Florida Ice Association Holds Annual Convention—Ice Problems Stressed

FLORIDA ice manufacturers, their wives, associate members and guests in attendance at the 26th annual convention of their state association, joined in a vote of thanks to the members of the convention committees who were responsible for making the meeting one of the best ever held. The hospitality of the local members, the lovely environment of the Sheraton Plaza and the splendid talks given by those who appeared on the convention program, all made it one which will long be remembered. The convention was held October 14 to 16 at Daytona Beach.

The Ocean Room, with the million dollar view, in the spacious Sharaton Plaza hotel on Daytona Beach was the scene on October 14 of the first entertainment feature of the meeting. Daytona Beach ice manufacturers and their ladies were host at a cocktail party and their warm welcome, bounteous refreshments and successful efforts in seeing that everyone had a good time, made this affair one of the high-lights of the convention.

Opening Session

The first business session was opened by President E. E. Melton Monday morning. Mr. Melton reviewed association activities during the past year and cited the engineering and merchandising short courses as the outstanding accomplishments of the state organization during his administration. He regretted that more ice men did not take advantage of these fine opportunities. He urged members to give his successor their whole-hearted cooperation.

Ice for Vegetables

Dr. F. S. Jamison, horticulturist in the University of Florida Agricultural Experiment Station in Gainesville, Fla., described the importance of ice in the marketing of Florida's $200,000,000 vegetable crop which represents 40 per cent of the agricultural income of the state.

Because of Florida's peculiar geographic position with regard to her markets, refrigeration becomes a prime factor, he pointed out. Further, ice man's ice plays a big part in getting the Florida vegetable crop to market in saleable condition. Ice performs two functions, that of lowering temperatures, halting plant respiration, and providing high humidity, eliminating excess loss of plant moisture. A third function performed by ice, he added, is the preservation of natural vegetable color.

Dr. Jamison pointed to Florida's 10-year rise in sweet corn production, emphasizing that quick elimination of field heat plus refrigerated transportation to market has overcome the problem formerly posed by the fact the vegetable will lose half of its sugar in 24 hours after harvesting, at 80 F. Held at 35 F it will take a week or 10 days for it to lose this much sugar.

Attention to Sanitation

Urging ice manufacturers to pay more attention to sanitation, President V. C. Wilcoxon of the Florida Restaurant Association pointed out that ice is the first thing they serve a customer.

Restaurants in Florida must conform to rigid sanitation laws and are subject to regular inspection, he said, but dirty ice results in dirt particles in the drinking water and that costs customers.

For fish there is nothing better than ice, the Vero Beach man told his listeners, adding it was his conviction that the two industries should cooperatively seek the answer to their mutual problems. "You tell us if we're not handling your ice the way we should and we'll tell you when we find splinters in our crushed ice," he said.

Small Plant Operation

Small ice plant operations, 25 tons daily or less, usually suffer from poor accounting, poor personnel, and poor public relations, A. Sterling Hall of Bradenton stated.

"Usually the small plant is operated by a man who just 'grew into' the business," he said. "And that's bad because he doesn't realize the value of cost accounting under modern conditions." Not only is good accounting important as a management tool but it's a "must" if you are called upon to defend your income tax return.

"Poor help, especially drivers, has cost the industry millions and millions of dollars worth of business that shouldn't have been lost," he continued.

A warning against permitting drivers to take trucks home followed as Hall pointed out the "fine print" in many liability insurance policies excludes coverage when vehicles are in private or pleasure use.

Good management of the small plant calls for careful comparison of the Diesel vs. electric drive, Hall said, adding that "I am a long way from being sold that the Diesel is best when you take into consideration shutdown and non-operating time."

He urged operators to negotiate their electric contracts for possible off peak rates, pointing out that ice consumption is generally lower in winter when other electric usage is higher, and that frequently ice plants can shut down during early evening.

State Finances

The collecting of $341 million, the spending of $344 million and the writing of 3½ million checks are just part of his job, State Comptroller Clarence Gay told the Convention. After reviewing the general classes of expenditures, and making the point that the comptroller is responsible for verifying the accuracy of the bills rendered, the speaker pointed to new firms now making their home in Florida because of a favorable tax structure.

"I hope the time will not come when we do away with our constitutional restrictions against income taxes," Gay said. "I urge you to fight against it because I think the time has come when we can operate this state under our present tax program."

He pointed to the need for leadership in government all the way from "the city hall to the White House" and urged his listeners as business men to help encourage government to live within its income . . . "if free government is to survive."

Poultry Icing

Ice preserves the bloom, maintains moisture content, and has a glamorizing glitter that helps in the merchandising of broilers, stated C. A. Kalbfleisch of Nashville, explaining the story of Swift & Company's promotion of "chickens on ice." Sound strip films, over-wire displays, graphic

sales charts and other merchandising tools are offered to ice men without charge, to assist them in encouraging the use of ice in poultry retailing. In addition to other advantages, Kalbfleisch said, use of ice saves up to 11 per cent shrink because of its humidifying property.

Automatic Controls

Automatic control devices which are widely used in mechanical refrigeration and air conditioning, deserve a much wider application to the ice manufacturing industry, according to C. T. Baker, Atlanta consulting engineer.

Speaking to the convention with the benefit of projection slides, Mr. Baker described the use of float controls on coils "to make sure coils are flooded" and thus operating at peak efficiency, the use of thermal expansion valves and solenoid expansion valves for safety and efficiency, and the high pressure cut-out which would automatically stop the compressor at the danger point, instead of depending on safety valves.

Use of such equipment has made possible the semi-automatic plants, he said, and in response to a question from the audience he said that the so-called automatic plants may sacrifice quality for the sake of efficiency and economic operation.

Research in Ice Uses

Wm. T. Jobe of the National Association of Ice Industries reviewed his organization's "stewardship" during the past year, briefly covered the effects of mobilization on the ice industry, told of research in wider use of ice and his group's highly successful public relations program.

Research in sweet corn, he said, is under way at Ohio State, with a study of consumer acceptance going on at Indiana. In Illinois, studies "definitely prove the value of ice in marketing sweet corn for local consumption," and other research embraces the use of wet-strength paper bags for packaging.

At the University of California, studies in meat icing (use of a bed of ice in a mechanical display case) indicate improved color, bloom, sales appeal and lower shrink.

Research in the ion exchange technique in water treatment is under way at the University of Texas under a two-year program, and the association has assisted in the issuing of a water treatment manual.

Rushton Discusses Salesmanship

Declaring that the ice industry has lost its salesmanship but has gained an opportunity for continued profitable existence through the use of vending machines, J. Frank Rushton, past president of the National Association of Ice Industries, cited figures from the Rushton Co.'s Birmingham Ala., operation indicating an annual gross profit of 30 percent on three self-service vending installations. "Selling ice as a food and beverage is not as productive of tonnage, but it will produce profits," Rushton said. will produce more sales and profits," Rushton said.

In his talk Mr. Rushton "digressed" briefly to decry modern America's unwillingness to accept the hazards and responsibilities that accompany freedom. He painted the picture of discouragement that faces today's young man who must overcome huge capital outlay, taxation, labor problems and other difficulties in establishing his own business.

Free Enterprise Defended

Dr. Frank Goodwin, Professor of Marketing at the University of Florida, drove home to the conventioners the need for a vigorous defense of the American system of free enterprise. Using an inexhaustible supply of anecdotes, and a flip-over chart, Dr. Goodwin declared the nation's greatest resource is the "unsatisfied wants of the people," and warned that this resource is being countered by the "something for nothing" philosophy which is attacking the very roots of our democracy.

Comparing private enterprise with fascism, socialism and communism, he admitted that all were seeking a common goal but warned against the fallacious view that "it doesn't make any difference which one you take." There is a very vital difference, he said, in that free enterprise alone takes into account the worth of the individual.

"Frank Rushton has told you that liberty and security are incompatible," he said, "and I tell you that it is a fallacy to think that you can inherit liberty. Each generation that is free must deserve to be free; our fathers made only the down payment on our freedom, we must make a payment every day of our life."

Resolutions

Resolutions of condolence for members who had passed away during the year were read by a member of the resolutions committee.

A resolution asking the endorsement of the Florida Ice Association for the transfer of $1600 in the John Gorrie Memorial fund to the Cancer Society for cancer research, was passed.

Officers Elected

The following officers and executive committee members were elected:

President, R. A. David, Jacksonville, Fla.

Vice-president, Glen Greene, Miami, Fla.

Treasurer, H. R. Kahler, Miami, Fla.

Executive Committee: R. E. Cook, Miami; W. O. Shaddix, Daytona Beach; Guy Spearman, Jr., Pensacola; J. L. George, Gainesville; E. B. Stewart, Tampa; E. E. Melton, Mulberry; A. Sterling Hall, Bradenton; B. C. Brown, Orlando.

At an executive committee meeting held immediately after the regular meeting, Miss Muriel Washburn was re-appointed as executive secretary of the association.

More Selling Needed

On the closing afternoon of the convention, George V. Warren, ice appliance merchandising manager with City Products Corp., Chicago, Ill., challenged Florida ice men to buckle down and go out and get business that is waiting for them.

The sales specialist discussed ways and means of getting new customers and keeping old ones satisfied, and suggested that more time be given to the selling of ice appliances. He pointed out the advantages of advertising and creating good will through the distribution of small packages of free ice cubes, and in closing Mr. Warren stated that he knew ice and ice appliances could be sold, because he was doing just that every day.

The open forum was staffed with experts and many interesting and worthwhile questions were asked of them and answered. The question that brought on the most discussion and seemed to cause many present the biggest "headache" was special deliveries of ice.

Ladies Entertainment

Visiting ladies of the convention were escorted by Daytona Beach Ice Manufacturers wives to the Palmetto Woman's Club on October 16 where they were served a delightful luncheon.

The convention ended with a beautiful and delicious buffet dinner, followed by dancing.

Northwest Association Of Ice Industries

L. F. MARSH, *Secretary*

THE Northwest ice industry started out with a very poor spring, after the coldest winter in years. Ice sales were way down at first, but we were fortunate in having a break in the weather and a good summer. This year's tonnage probably will be equal to, and possibly above, that of last year. Whether or not there will be any profits is an open question since costs are so high that it is difficult to make a delivery route show a profit.

Sized ice and snow ice are showing more tonnage each year in the places where they are handled. The companies that have been putting out sized ice have seen a continuous increase in that business each year. Block ice is still in demand but the tonnage, except for certain large users, is less each year.

Ice refrigerator sales this year are way down. The reason for this is hard to say; possibly it is in direct ratio to the sales effort, although one or two companies which did do a fair selling job in past years report that their sales were below normal this year.

Canadian Ice Publicity

THE Advertising Committee of the Canadian Association of Ice Industries has been in contact with Miss Marie Holmes, Director of the Chatelaine Institute. As a result of this contact, Miss Holmes is planning on featuring ice bowls in the December issue of The Chatelaine magazine. The illustrations will be in color and there will be considerable copy describing the punch bowl and its many uses in entertaining.

An interview is now being arranged with Mrs. Katharine Caldwell Bayley of the Canadian Home Journal Home Service Bureau to acquaint her with the recent developments in the ice industry and the Advertising Committee is hopeful of receiving favorable copy in that magazine.

North Carolina Ice Association

THE forty-third annual convention of the North Carolina Ice Association will be held at the Hotel Sir Walter, Raleigh, N. C. Monday and Tuesday, March 10 and 11, 1952. Lewis H. Powell, secretary-treasurer, announces that an interesting program will be presented.

Illinois Association Of Ice Industries

WM. D. WRIGHT, *Secretary*

A RECENT letter from L. E. Vilmure of the Office of Price Stabilization, Springfield, advises that the only business concerns who need file under the Service Regulations are those which sell a service to the public at a ceiling price and that such services do not include the delivery of ice or coal. This was to correct a recent notice sent to some members regarding their compliance with ceiling price regulations.

At a recent meeting of the Board of Directors it was decided to hold the 45th annual convention of the Illinois Association at the Leland Hotel, Springfield, March 20-21, 1952. The program of this meeting as well as that of the National Ice Convention (November 13-16) is designed to provide opportunity for concerted planning and a free exchange of information.

Michigan Ice Industries Association

THE fall conference and group meeting of the Michigan Ice Industries Association was held Tuesday, September 25 at the Roosevelt Hotel, Lansing, Mich. This was one of the most interesting as well as important meetings sponsored by the association. The topics discussed were very timely and of prime importance to every member of the ice industry. The meeting started at 1:30 p.m. and in the evening the group had dinner at the hotel. The conference was divided into three sessions covering merchandising, distribution and future prospects of the ice business.

Canadian Association Of Ice Industries

THE 30th annual convention of the Canadian Association of Ice Industries will be held at the Royal York Hotel, Toronto, Canada, November 22-24, 1951. The program will include discussions of automatic ice vending machines, employee relations, commercial ice selling, refrigerator sales, supply exhibits, advertising round table, and merchandising. Outstanding speakers will discuss assigned subjects on outstanding phases of present day ice problems. On the lighter side a wonderful program of social events has been planned, including a get-together party and the president's annual party and dinner Friday evening.

The Ice Industry

Poultry and Egg Board Holds Schools in Indiana

THE National Poultry and Egg Board has a representative in Indiana who is instructing retailers in the latest methods of merchandising poultry and eggs. Special emphasis is on chickens and turkeys. Schools have been held in Elkhart, Terre Haute and Indianapolis, and plans were being made to conduct them in other cities.

Cooperating in these schools are Purdue University, Indiana Retail Grocers Association, Armour and Company, The Wadley Company, Swift and Company and the Indiana Association of Ice Industries. Cooperating organization report enthusiastic acceptance of the program in all areas where the school has been conducted.

The Indiana Association of Ice Industries purchased a five foot Trusty poultry case, used by the schools for demonstration of proper display of fresh poultry. Liberal use of ice was strongly advocated by the Poultry and Egg Board and it is reported that in many instances these schools have been directly responsible for the sale of ice-using equipment.

Delta States Ice Association

THE annual convention of the Delta States Ice Association will be held at the Buena Vista Hotel, Biloxi, Miss., December 3-5, 1951. Committees in charge of the convention are lining up an interesting program of both business sessions and entertainment.

Among the subjects to be presented by formal papers and informal discussions are: economy in production, aggressive merchandising, increased sales of processed ice, pricing regulations, self-service, loss of rural routes, wage and hour problems, sidelines.

Entertainment will be provided by the president's cocktail hour, ladies' luncheon, tour for the ladies, bingo party, ladies' coffee hour, the annual banquet and floor show.

The latest models of ice-using equipment, appliances, and uniforms will be on display in the Hurricane room. Associate member representatives will be on hand to keep members informed on their products and services.

Indiana Association of Ice Industries

By ROBT. WALTON, Secretary

THE 1951 state fair again afforded the Indiana Ice Industry an opportunity to exhibit the relative merits of ice in the preservation of perishable produce. The Indiana Association of Ice Industries cooperated with the Fair board in protecting the prize winning 4-H garden exhibits in the Agriculture-Horticulture building. These top placing exhibits are displayed in a specially constructed case, thereby assuring their freshness throughout the Fair week.

In the same building the association cooperated with the Indianapolis Vegetables Growers Association and the DeKalb County Vegetable Growers Association in wall exhibits of mixed varieties of vegetables and a sweet corn exhibit. Display cases were used by both associations. Those used in the Indianapolis exhibit were furnished through the courtesy of the Trusty Manufacturers, Inc., La-Porte, Ind. and the DeKalb County growers were furnished equipment by the Polar Ice and Fuel Company of Indianapolis.

Of special interest was the sweet corn exhibit of DeKalb County. This exhibit traced the new ice method of handling sweet corn from field to retail outlet, and is indicative of the tremendous popularity that iced sweet corn is now enjoying in the mid-west. This exhibit was unsolicited by the ice industry, and represents the spontaneous result of a sound research program.

In connection with these projects, valuable assistance and advice was rendered by Mrs. Harriet Gray and staff of Polar Ice & Fuel Company, Indianapolis.

In early summer, the association purchased 2000 paper bags for packaging of iced sweet corn. Although, fundamentally an experimental buy, it was hoped that these paper bags could be sold to sweet corn growers in Indiana. Previously, standard packing procedure was to use bruce wood lettuce boxes, in which five dozen ears of corn were packed and approximately 18 to 20 pounds of ice added. The snow ice is in addition to hydrocooling. Although the wood boxes are satisfactory, they lack the flexibility of paper, and are less attractive. The 2000 paper bags were snapped up immediately by far sighted growers, and we could have sold thousands more had they been available. The icing of sweet corn in the field is rapidly becoming "Big Business", and is concrete evidence of new markets available to those who are alert to opportunity.

A training program, directed by the Distributive Education Department of Indiana University will again be offered to members of the association in 1952 and plans are under way to offer the latest and best in training techniques. Previously it was announced that federal funds would not be available for that purpose but President Wells of the University, recognizing that the program has been highly beneficial to small business, recommended that state funds be used to make up the loss in federal funds. This will make it possible to continue the training program through 1952.

Chamber of Commerce Dressed Poultry Show

THE Indiana Association of Ice Industries and the Polar Ice & Fuel Company of Greencastle cooperated with the Greencastle Chamber of Commerce in a 4-H dressed poultry show September 26-29. The poultry show was the culmination of an extended poultry promotion program in Putnam County designed to stimulate interest among farmers in the raising of commercial broiler type chickens. The goal of the Greencastle Chamber of Commerce is volume production of broilers in Putnam County toward the end of attracting a commercial processor of chickens to the Putnam county area.

Ice Company Discontinued Competition Blamed

THE Northern Ice Company, Inc., Watertown, N. Y., has discontinued business, it was announced by Walter W. Claxton, president and owner. The ice-making plant at 465 Martin Street will be dismantled and the building, which houses the plant, will be sold. Mr. Claxton said the move was made because of effects of competition. He also said that business in that area had been particularly affected because of the short summer season.

The discontinuance of the Northern Ice Company brings to a close a business that has been in operation over 75 years. The Northern Ice Company is the successor to the Watertown Ice Company, which in turn was the successor to Chauncey W. Gray and Clinton Ryder, ice dealers in Watertown.

Pointers on Parking For Ice Service Men

ICE service men, for the most part, have and maintain a high degree of safe driving. But all of them would find it valuable to refresh their memories occasionally by turning their thoughts toward specific points of safety. A recent bulletin of the Michigan Ice Industries Association issued by Ed Jackson, secretary has the following comments on parking:

"Parking is a concern mainly with respect to place of parking and method of entering or leaving the parking space.

"In congested areas park, after properly signaling, from only the right hand lane unless traffic signs otherwise direct. Always turn your front wheels so that the front of your vehicle will coast into the curb if the brakes should fail. Where there is no curb, you can guard against runaway, particularly in the case of trucks, by blocking the wheels with chocks, tree limbs or whatever is available.

"Park properly and safely at proper places.

"Secure your vehicle to avoid its movement while unoccupied or its use by an unauthorized person.

"When preparing to leave your vehicle do not get out, incautiously throw open your door, into the path of oncoming traffic. It should become a habit never to stand between parked or standing vehicles when either vehicles is being started or preparing to move.

"Always check traffic flow before leaving a parking space to enter traffic. Open the door for a better view behind if at all in doubt."

South Carolina Ice Manufacturers Association

THE annual convention of the South Carolina Ice Manufacturers Association will be held at the Columbia Hotel, Columbia, S. C. Monday and Tuesday, December 3 and 4. An interesting program has been prepared according to George L. English, secretary.

Explosion Damages Ice Plant

AN EXPLOSION rocked an area six blocks square and caused $5,000 damage to the Puyallup Ice Co., Puyallup, Wash. recently. C. J. Brakefield, fire chief, said the explosion apparently was caused by excessive steam in a receiver tank at the plant.

Practical Refrigerating Engineer

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS

Howard Peterson, Yakima, Wash.
President, National Association Practical Refrigerating Engineers

NEWS

OPERATING

MAINTENANCE

QUESTIONS -- ANSWERS

OFFICERS

President
HOWARD PETERSON, *Yakima, Wash.*

First Vice-president
A. R. CARLSON, *Chicago, Ill.*

Second Vice-president
ALVIS CLAY, *Memphis, Tenn.*

Treasurer
LELAND KENACY, *Newton, Kans.*

Sergeant-at-Arms
H. B. BRANHAM, *Pocatello, Idaho*

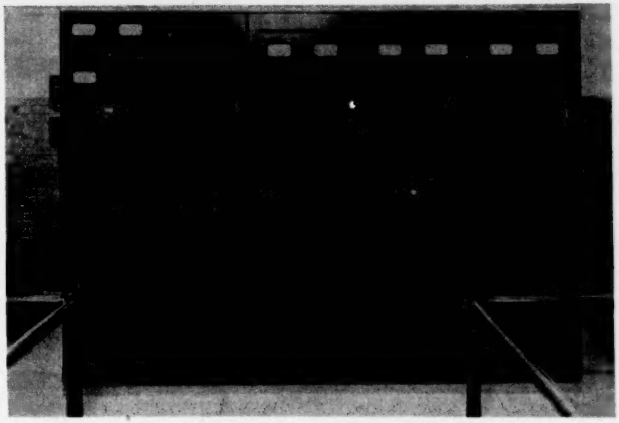
EXECUTIVE OFFICE
EMERSON BRANDT, *Secretary*
435 North Waller Avenue
Chicago 44 • Illinois

Modernization— A Step by Step Program

THE present scarcity of pipe, manpower and general construction materials presents problems for plants that wish to modernize their equipment and methods. Actually the production of metals and other materials has increased but with record construction going on the demand has gone up even more. Hence the general shortage.

Under these conditions many plants are reluctant to initiate a full reconstruction program though they desire to make their plants more efficient and cut costs. As a compromise it is possible to do the plant modernizing job in a step-by-step process which reduces the period of interruption in operation and also the problems involved in handling the entire job on a time limit basis.

This course has been followed by the Railways Ice Co. in several of their plants in the south and southwest. For example their Nonconnah plant at Memphis, Tenn. was originally installed in 1915. It followed the good practice of that day in equipment and design and had operated well since that time. Rated at 140 tons ice production daily, the plant has 1632 cans in two freezing tanks. The ammonia compressors installed in 1915 were two vertical double acting duplex machines. These were the A-frame type, 18½x28 inches, driven by condensing engines. Three coal-fired boilers furnished steam for the plant. The auxiliaries in the plant proper were belt driven from a jack shaft which, in turn, was belted to the fly-wheel of one compressor.



This switchboard handles incoming power, in-plant distribution, and the three synchronous motors on compressor drive.

Although the plant had operated well for many years, there were a number of considerations to indicate that modernization would be desirable. Coal cost had not just increased, it had multiplied. The firing labor or boiler attendance had increased in unit cost through the years to where it had become a more important consideration. In evaluation of plant methods with a boiler plant where steam is not required for process work or heating, the cost of supplies and maintenance bulks comparatively large.

An electric drive plant with automatic control not only takes advantage of power rates which have been considerably reduced in this territory in recent years, but it also frees the engineers from constant attention to expansion valves, compressors and other equipment. A modern compressor plant also gains greatly in flexibility. This is quite evident in comparison of the operation of several boilers with multi-unit compressors under automatic control. The latter go on and off the line in immediate response to load changes but steam boilers naturally cannot be so responsive. All these considerations led up to the decision to convert the refrigeration section of the plant.

New Equipment

The refrigerating compressor capacity of the plant is divided on four units. One 11½ x 10 VSA ammonia compressor is driven by a 150 hp synchronous motor, two 10 x 10 VSA machines are driven by 125 hp synchronous motors. All three motors were furnished by the Ideal Electric and Manufacturing Company. A 6½ x 6½ VSA machine is installed primarily for holding temperature in the tanks and refrigerating the ice storage rooms. The two 10 x 10 compressors are equipped with automatic control. The starts and stops of these machines are initiated by high and low pressure switches operated by suction pressure. When the suction pressure rises to a set point, the high pressure switch cuts in and operates three controls (1) the motor starter is tripped (2) a solenoid valve in the by-pass from discharge to suction line is opened (3) a solenoid valve on the cooling water line opens to circulate the water through the compressor jacket.

The compressor motor goes up to speed then a time delay switch cuts off the power to the bypass solenoid valve and the compressor is on the line. Since these are synchronous motors, the time delay switch is set at about thirty seconds to be sure that the motor is properly started. If sufficient interval is not allowed, the synchronous motor will not pull in and keep going. An induction motor would require less time interval. The time switch is set by test and the length of the interval is not too important because there is no damage if the compressor runs an added few seconds unloaded.

The two compressors are taken off the line when the suction pressure falls, and the low pressure switch cuts them out. Both the high and low pressure switches are set in steps so that there is a sufficient time interval between the cut-in and cut-out of the two compressors.

Installed with the new compressors was a new switch board; an incoming panel, a distribution panel and three synchronous motor panels. This layout gives modern control for the various sections of the electric system and the starting of the synchronous equipment. It was designed by Jay Watson, Ideal Electric and Manufacturing Co., Chicago district.

In this particular plant the design and layout of the brine tank coils is such that ammonia feed is controlled by thermostatic expansion valves. These valves do not handle the complete flow of liquid to the tanks. Hand expansion valves take care of base load while the thermostatic valves adjust the remaining operation of the liquid ammonia feed to take care of whatever fluctuations occurred in refrigeration demand.

In other plants, the Railways Ice Company has made use of an electric eye control which maintains the set liquid level in the evaporator coils. As a precaution a float switch is installed to cut off liquid feed in case the level goes too high. The liquid eye control was illustrated and described in ICE AND REFRIGERATION, July 1947, page 43.

Based on operations following the plant modernization, the Railways Ice Company reports worthwhile savings have been made in both power costs and general operating expenses. The flexibility in the operation of the plant has been everything that was desired. This is a natural result of a multi-unit refrigerating plant. The engineers have been freed much of the time from their previous tasks so that they can carry on in other work around the plant.

In furnishing information for the subject, A. R. Carlson, chief engineer of the ice company cautioned, "Don't report this as though we consider the methods or equipment used are new. N.A.P.R.E. engineers are familiar with it." He was assured that his advice would be followed but it was pointed out that many more plants can follow a step by step program of this type. Also the owners and operators of these plants appreciate knowledge about what others have done in this field and what they have accomplished.

News Notes and Chapter Activities

New Orleans

By LEO VIVIEN

AT THE August 8 meeting Instructor B. Mancuso continued his course on Operation and Maintenance of Refrigeration Plants. The subject discussed was Two-Stage Compression. Mr. Mancuso explained how this system works and why it is used in place of single-stage compression.

The August 16 meeting was on Plant Safety Devices. All phases of the installation, uses and construction of safety valves, fusible plugs, rupture disks and warning signals were discussed. The subject proved quite interesting and many questions were asked and answered.

The first meeting in September all technical subjects were dispensed with and a party was arranged by the Entertainment Committee, J. Chaisson, J. Duffy and B. Triche. The main fare was Shrimps, Hot Dogs and Beer. About 95 members were present. Needless to say a good time was had by all. We took this opportunity to try and instill the competitive spirit necessary to win the membership contest and I believe the boys are going to try to beat Los Angeles so I can eat off of Ray Burnett instead of his enjoying a meal on me.

September 25 we went back to our regular meeting schedule, and Mr. Mancuso presented a lecture on Refrigerating Controls, types of valves and their uses. He took control valves apart and showed us how they operated and how to make adjustments and repairs.

Discussion ensued relative to the new course on Refrigeration by Guy King which would soon commence. The members feel that this course will be interesting. Members are now working toward getting new members in time to participate in the course from the beginning and we are hopeful of making our stretch drive successful.

Memphis

By CHARLES CONLEY

AT THE first meeting of the period there was a round table discussion on plant and operating problems. The 1951 Operating Data Books were passed out to those present and there was a good group to receive them.

The idea of starting the NAPRE was originated in this section of the country. This is another reason why all the members of the chapter are interested in the national convention to be held here in November. We expect there will be good attendance and are looking forward to greeting our members from all around the country.

At the next meeting the Coordinator of Vocational Education of the Memphis Schools met with the group. The new Refrigeration Course was approved for the educational program of the chapter and the local school system will furnish an instructor to present this course.

Los Angeles

By Fred Herr

LOS ANGELES Chapter's first business and educational session of the fall term was held on the night of September 19, with first vice-president Edgar M. Marrs presiding in the absence of President George Paulick.

The meeting coincided with what was probably Los Angeles hottest day of the year, with a 90 plus temperature at 7 p.m. when the preliminary class got underway. It was shirt-sleeve and sport-shirt weather and such a noble collection of gay sport shirts never before filled the auditorium at the Terminal Club. Had a contest been held, W. R. Burnett unquestionably would have won first prize as the wearer of the most colorful sport shirt of the evening. The national membership chairman showed up in a really hot creation—a bright crimson job, with what appeared to be green and gold gargoyles flitting about on it.

Capt. Herbert Royden reported that Mrs. Florence E. Alderman, wife of Enos W. Anderman, an NAPRE member since 1921, had passed away on September 9. She had been Past Worthy High Priestess, El Bireh Shrine No. 26, Order of the White Shrine, Los Angeles, and first matron and organizer of Harding Chapter, No. 454, Order of the Eastern Star. The suggestion of Chairman Marrs that the NAPRE send flowers was approved.

The applications of ten new members—the result of the members' work during the summer months—were approved. These new members are:

Ben F. Duncan, Baker Engineering Co. Walter Rainey, Associated Refrigeration Engineers; James B. Joy, Carveyor Corp.; Ramon O. Dominquez, Pacific Fruit Express; Garland L. Rusher, Union Ice Co.; Milton Shell, Union Ice Co.; Ben W. Lillibridge, Pacific Fruit Express, Sparks Nev.; Willard H. Rumpf, Lawrence Warehouse Co.; J. E. Zahn, Aerojet Engineering Corp.; Carlo J. Cardela, American Agar & Chemical Co., San Diego.

The above group of ten brought the chapter's total of new members procured during the 1951 drive to 36, as of that night. The contest between the two chapter teams was extremely close. The Union Ice Co.-California Consumers Corp. team having signed up 19 and the Independents team 17. Donald Byl of the Union Ice Company was announced as the high man, which came as no surprise to any one, as Mr. Byl has been signing up prospects right and left all year. His total is ten.

As an additional spur during the closing weeks of the drive, Membership Chairman Burnett had special announcements sent out on October 1. These combine on one sheet an NAPRE application blank, along with a plea from the chapter treasurer to go all out during the last two weeks of the drive in order to save Ray Burnett from the dire fate of having to buy a steak dinner for President Howard Peterson. The plea follows:

"A Note from your treasurer; We all know how loyal Ray is to Los Angeles, but if Texas beats Los Angeles—will we be able to stand him as your national membership chairman? He will have us all singing "EYES OF TEXAS" before each meeting."

Burnett himself issued a warning at the meeting that a definite dark horse has developed down in Texas which may deprive Los Angeles Chapter of its ambition to win a second leg on the plaque. Burnett intimated that Dallas, Tex., Chapter, is showing so much vim and action, and is literally oozing with confidence, that an all-out drive during the remaining weeks was imperative on the part of the Los Angeles gang.

Regis Gubser announced that the Los Angeles Trade Technical School is offering a class in electricity for operating engineers which is designed to aid refrigeration, steam, power and electrical engineers.

The speaker of the evening was Frederick Hammond Green, preliminary, design engineer of Air Research Manufacturing Co., of Los Angeles. His subject was "Survival at High Altitudes." He exhibited a model air expansion turbine and other equipment.

The speaker told about the strange effects of high altitudes and dizzy speeds and their solutions. He described one ton refrigerating systems of unbelievably small size that virtually fit into an overcoat pocket; and all in all presented an illustrated lecture that measured up to the announcement of Secretary Donald Byl that Mr. Green would talk about "... things in real life akin to Flash Gordon's fantastic world in the Sunday funny papers."

By means of a speed temperature graph, Mr. Green described the temperature created by ram compression on the skin surface of an airplane at extreme speeds. He said that temperature is a new barrier to supersonic flight and that ram heat makes the cockpit unlivable.

"The extreme temperature created by ram compression on the surface of the jet or rocket ship is one of the most critical problems being encountered as airplanes approach transonic and supersonic speeds," Mr. Green said. "All air taken into the cockpit for the pilot to breathe is ducted from leading surfaces, the highest point of ram temperature. A high percentage of the heat of air friction is transferred through the airplane skin into the cabin."

The speaker also explained how initial ram air also picks up more heat before entering the cabin when compressed for cabin pressurization in the jet engine, and that within the earth's atmosphere, the faster the airplane goes, the more unlivable conditions become for the pilot.

Mr. Green declared that a ram compression temperature of approximately 165 Deg. F. was recorded by the Douglas Skystreak during its record breaking speed flight of 651 miles per hour in August, 1947.

"Livable cabin temperatures in today's high speed planes have been made possible by the air expansion cooling turbine," Mr. Green said. He explained that the turbine refrigeration system used on the Navy-Douglas Skystreak, and now in use also on most other high speed planes, was developed by Air Research Mfg. Co.

He explained that turbine refrigeration units weighing less than 16 pounds produce 4.2 tons of refrigeration. They drop the temperature of air passing through them over 600 degrees. By cooling the hot compressed air bled from the jet engine for cabin pressurization, the system supplies a constant source of cold air to the cabin.

Mr. Green declared that the speeds above the sonic range, at which the critical ram temperatures are encountered, will become possible only as fast as methods of airplane refrigeration are improved. While experiments by the University of California at Los Angeles showed that man can withstand a temperature of 250 deg. F for several minutes, Mr. Green declared that this man's mental and physical condition was far from that demanded of a pilot traveling at supersonic speed.

On October 3, the chapter accepted the invitation of Art Bender of Bender Machine Company, to make a guided tour through the plant at 2059 East 37th Street. Some 50 members availed themselves of the opportunity to examine the firm's new shop facilities. A highlight was a demonstration of metal spraying processes. Refreshments and movies were provided with the compliments of the management.

It was announced that the locale of the Fall Festival, on November 7 formerly called a Jamboree, had been changed to the Palos Verdes Country Club. Originally planned as an evening show only, the new plans made it possible for NAPRE members to partake of a golfer's lunch at noon, play golf in afternoon, attend a cocktail hour at 6 p.m., eat dinner at the club at 7 p.m. and attend the NAPRE Fall Festival beginning at 8 p.m.

Colton

By John Mairs

WE HELD our regular meeting on September 12 having as guest speakers, George Keller of Keystone Lubricating Co., and H. H. Murphy of Warren Bailey Co.

An interesting and informative lecture on lubricants and insulation was very ably presented. Mr. Keller set up a particularly fine display of lubricants and explained the many new problems being met by the industry with new types oils and greases. Mr. Murphy gave interesting facts on various types of insulation and advice as to the best use of various insulating products.

This account is being sent in by a temporary reporter because our "workhorse" Harry Bonter has been laid up due to an injury and others of us are substituting as best we can. Mr. Bonter suffered serious injury on September 28 and has been confined in the Southern Pacific Hospital, San Francisco. He has been glad to hear from the many friends he gained during his long service with Colton Chapter. We have all been looking forward to having him back with us.

Rio Grande Valley

By Armin Doneis

OUR recent meetings of the Rio Grande Valley Chapter of NAPRE have taken on new life and interest, although the attendance could be better. Our Instructor, John Muller, has come back to carry on with us, and in order to facilitate his schedule we have changed our meeting nights to every other Tuesday evening instead of Mondays.

At one of our meetings we discussed the construction and operation of pressure-actuated automatic expansion valves, thermostatically operated expansion valves and also capillary expansion tubes. The problems of valve-stem and packing maintenance on ammonia valves was also considered at length.

During the more recent meetings we have been engrossed in the design calculations for the construction of a Freon cooled ice-storage vault for the exercise in figuring heat loads and choosing of equipment to suit the application.

During the instruction period of our meeting of October 2nd, we resumed this discussion and engaged in the choice and arrangement of finned coils and expansion valves and controls. The various possible methods and the probable final choice were considered at some length with much benefit to all present. Milton Sudbury of Pharr, one of the visitors for the evening added some pertinent comments and information that helped us over some rough spots in the designing.

For the question period, Instructor Muller had brought along damaged parts of a 4 x 4 ammonia compressor which apparently failed without much warning. The connecting rod bearing had failed and the connecting rod had been quickly worn completely in two by the crank throw, which condition allowed the piston to be pushed downward to a point where the crankthrow came around and bent the connecting rod and broke the piston skirt. Considerable time was spent in examining the parts and trying to reconstruct the conditions and sequence of events that lead up to the final damage.

It was agreed that the metal wiped out of the top half of the bearing packed into the lower half, thus increasing the clearance above the piston. This added clearance above the piston allowed a pocket of reexpandable gas to serve as a cushion above the piston, and the metal packed in the lower half of the bearing helped take up the slack in the bearing. As a consequence excessive pounding of the bearing was prevented, which pounding would ordinarily have served as an alarm for the machine's distress.

During the business meeting of Oct. 2nd the high quality of the new NAPRE Refrigeration Course by Guy King was praised by several oldtimers, and all were impressed by the comprehensive coverage indicated by the table of contents. Instructor Muller showed particular enthusiasm for the material and the way it is presented. It was decided that this material should be shared as widely as possible and that our chapter should embark on the new course at the first meeting in November, thereby allowing ample time for rounding up prospective members who would still want to get in on the beginning of the course.

Chicago

By E. B. Jones

THE members and guests of Chicago Chapter had a very interesting visit to the plant of Wilson and Company in the stockyards district. A tour of the power and refrigeration plants was arranged with various members of the engineering staff conducting the visitors in small groups. The arrangements were made by P. L. McGehee in charge of plants who introduced chief engineer Fred Foersch of the Power House and other members of the staff.

The plant produces its own power. Steam is produced at the rate of about 400,000 lbs. per hour in the powdered coal fired boilers. Steam turbines having a capacity of 6,000 kw. operate on steam at 400 lb with extraction at 150 lb to steam engines driving the refrigerating machine.

The refrigerating equipment is composed of vertical A frame and horizontal compressors with a total capacity of 2250 tons. In addition there is an 800 ton absorption plant.

The visitors were impressed with the shell and tube condensers which they were told had not been retubed for 23 years. Chief Engineer Foersch explained that careful water treatment had maintained the tubes of these vertical condensers in good condition. The group was then conducted through some of the rooms in the cooler section of the plant and up to the eighth floor to see the Pak-Ice machines which produce ice briquettes for use in the bunkers of refrigerator cars. There were seven of these 30 ton machines set up in a separate room where they discharge into large storage bunkers below.

After the group assembled in the cafeteria Leslie Clifford presented a lecture on the first chapter of the Refrigeration Course. He had assembled very good demonstration equipment which he put to interesting use in explaining the fundamentals and basic considerations underlying refrigeration. He certainly proved that good teaching ability not only adds interest to the subject but also enhances understanding.

Excellent refreshments including Wilson's delicious frankfurters were served and all the members enjoyed a social hour with the Wilson staff representatives. It gave the members an opportunity to express their appreciation for a fine evening.

Attending the meeting was R. A. Klockner, Vilter Manufacturing Co. who make the machines. He explained their operation in detail. Wilson engineers told how the installation had saved plant space and icing labor.

San Francisco

By N. O. Tice

OUR fall season got off to a very fine start with a fun and laughter night at the Burgermeister Brewery. Our good friend and fellow member, John Herzog was host and many of us for the first time had an opportunity to see and enjoy the fine surroundings in the new Blue Room.

At our regular meeting on September 26 we met our new instructor Don C. Bryant of the San Francisco City College staff who presented the first refrigeration class in the fall program. We are fortunate to have Professor Bryant to present this excellent course to our members at no charge through the courtesy of City College of San Francisco. He is an experienced teacher and we expect to derive much value from the course.

Fresno

By M. Pedersen

THE first meeting of the fall season was opened with a very good educational program presented by Thomas Hagar. He told us all about induction motors and the utilization of 3 phase power. Many of us had our questions on this useful subject properly answered.

Toward the end of summer the members of the chapter and their wives had a very enjoyable pot luck dinner at the Shupe home. There was plenty of very fine food and everybody had a real good time. An added pleasure was the presence of Charles Fernald. It was good to have him with us again and looking so well after his auto accident.

St. Louis

By K. M. Holaday

CLOUDY weather did not mar the success of St. Louis Chapter's barbecue picnic October 6. Through the courtesy of Alvin Griesedieck of Falstaff Brewing Corporation, former President Charles Bergmann was able to arrange the gathering at a beautiful spot on the Griesedieck farm in St. Louis County.

Bill Wright was barbecue chairman. He is a working chairman, but he couldn't have got by without the help of Charles Bergmann, Ed Lotte, Harry Smith, Gene Bishop, and Les Fleiter. These lucky boys had the privilege of coming out to the country all day instead of just for the afternoon. During the morning they played around, putting up a tent, moving tables, benches, crates, tubs, buckets, jugs, and bottles, and building a fire. Les Fleiter missed some of the fun, but he arrived in time to go right back to town for something somebody forgot.

By one o'clock the gang had mostly drifted in and began to enjoy the fruits of the committee's labors. Large quantities of ribs, beer, beans, and other refreshments were consumed. This went on up to 6 o'clock and the stuff still tasted good. Activities, in the apparent order of preference, were eating, drinking, world's series broadcast, robust anecdotes, horseshoes, and polite conversation.

Attendance prizes were awarded as a feature of interest provided by the

following friends of the chapter: E. F. Drew Co., Griesedieck Bros. Brewery Co., Star Iron & Metal Co.; Falstaff Brewing Corp., N. O. Nelson Co., Stovey Co., L. V. Fleiter Co., Niagara Blower Co., Taylor Instrument Co., Freuler Sales Co., Rick Electric Co., Henry Vogt Co., Carl F. Gast Co., R. H. Spangler & Co., York Corp.

Many members had invited guests to share the occasion, and applications for membership were received from the following: Frederick C. Batch, Harry Crall, David F. Ready, Robert A. Best, Isadore Pass, Frank C. Smith, Clinton H. Butler, Jack W. Phelps, and H. W. Honefenger.

There was a good turn out for the first regular meeting of the season although there was no special speaker to feature the program. A question and answer session was conducted by K. M. Holaday and there was good participation by members in the discussion of the questions. The Refrigeration Course will be presented to the chapter by John Dabbs who has agreed to act as instructor.

N A P R E

Question Box

H. G. Venemann, Professor of Refrigeration, Purdue University and chairman of NAPRE Educational Committee, answers members operating problems monthly in this column. Send questions to Chairman H. G. Venemann c/o Purdue University, West Lafayette, Indiana.

Condenser Ratings

Question No. 898: I have assumed that horizontal shell-and-tube condensers could be rated at 10 square feet of tube surface per ton with 85 F cooling water supply and 7 sq ft per ton for 75 F water. Some condensers we recently installed appear to have a capacity considerably above that calculated by the above rating method.

Can you give me the correct surface areas per ton capacity for vertical and horizontal shell-and-tube condensers?—A.F.O.

ANSWER: In order to give a fairly reasonable value for the surface areas required per ton refrigeration capacity for either a vertical or a horizontal shell and tube condenser the following data should be given or calculated:

(1) Condenser length, dimensions of tubes, number of tubes, and number of passes.

(2) Inlet water temperature.

(3) Water quantity in gallons per minute or gpm per tube.

(4) Outlet water temperature.

(5) Water velocity through tubes. (This is calculated)

(6) Condensing pressure or temperature.

(7)Evaporating pressure or temperature.

On pages 280 and 281 of Refrigeration Theory and Applications is a table giving tons capacities of each tube in a vertical shell and tube condenser made of 2 inch tubes each 14 feet long. This table would not apply if the tubes were not 2 inch diameter or not 14 feet long. A study of this table shows a wide variation in capacity for each tube with 75F water. The smallest value shown with 75F water is .338 tons per tube, and the largest is 1.36 tons per tube. Since each tube has an outside area of 7.33 sq ft the smallest value is equal to 21.7 sq ft per ton, and the largest value is equal to 5.49 sq ft per ton.

Similar variations will be found with horizontal shell and tube condensers.

The A. C. R. M. A. equipment standards have published performance curves for 1¼ and 2 inch horizontal S and T condensers, and for vertical S & T condensers 14 ft long with 2 inch tubes. These are based upon heat removal of 250 Btu per min per ton, and on a temperature rise in the condensing water of 30 gallon degrees per min per ton. These same curves may be found on pages 425 and 428 of the 1949 A. S. R. E. Data Book.

If A. F. O. will give me the data requested above I will be pleased to answer the question more specifically.—H. G. Venemann.

Brine Cooler

Question No. 899: We have a brine cooling tank in which five banks of 1¼ in. pipe coil are installed. Each bank is 600 feet long; the total pipe is 3000 ft. The coils are in a cube shape tank about 6 ft in each dimension. The velocity over the coils is rather high. Ammonia feed to each bank of coils is controlled by a thermostatic expansion valve. What tonnage would you figure for this brine cooler tank?—A.F.D.

ANSWER: Using the following assumptions I would estimate the refrigeration capacity of the brine cooler at about 14.7 tons.

Weight of brine, 9.6 lb. per gal.; sp heat, 0.78

Inlet brine temp. 22 F.

Outlet brine temp. 18 F

Average brine temp. 20 F.

Brine pump capacity, 100 gal per min.

NAPRE Department

Brine velocity, less than one foot per min.

U value of coils, 9 Btu per sq ft per hr per deg difference.

Ammonia temperature, 5 F.

Suction pressure, 19.6 psig.

Surface area of coils, 1304 sq ft.

Tons capacity

$$= \frac{1304 \times 9 \quad (20-5)}{12000} = 14.7$$

The value of U is selected from Table XXXIII, page 270 of Refrigeration Theory and Applications. Since the coils are fed by thermal valves they should have a heat transfer value somewhere between Design A and Design B.

The brine velocity will be less than one foot per min. until the pump capacity reaches 157 gal per min. equal to 21 cu ft per min. I estimate the cross sectional area of the brine in the tank to be about 30 sq ft less 9 sq ft for the coils.

The data I have assumed checks closely with 14.7 tons when figured on the temperature rise of the brine:

Tons capacity

$$= \frac{100 \times 9.6 \times (22-18) \times .78}{200} = 14.9$$

The question states that the velocity over the coils is rather high. This is not a definite statement. If the tank contains baffles so that the brine velocity over the coils is 30 ft per min the U value would go up to about 18 or 19. This would double the capacity and make it about 30 tons. If the coil runs were shortened and large headers were provided for effective vapor removal the tonnage would be further increased.

If A. F. D. will send me correct data which I might use instead of the assumed values I will be pleased to work the problem again, or he may substitute the correct data in the above formulae and obtain a reasonable answer. — H. G. Venemann.

Freezer Room Coils

Question No. 900: In our plant we have a frozen food storage room at 0 F. It has brine pipe coils along three outside walls and across the ceiling. All are plain 1¼ in. pipe. We have calculated the heat load in this room carefully and it totals 5.5 tons of which practically all is wall and ceiling load.

The room contains a total of 4800 ft of 1¼ in. pipe. The temperature difference is 12 degrees F. If we use a conductivity factor, U of 1 Btu per

sq ft per deg per hr, the capacity of the pipe figures 2.1 tons refrigeration. At first glance it would appear that the U factor for this pipe is actually 2.6. Is this logical? Perhaps when pipe is used as a heat barrier along outside walls and ceiling, it has a higher rating than when used in bunker coils with gravity air circulation. Your opinion on this would be appreciated.—M.J.B.

ANSWER: I believe that a U value of 1.96 for 1¼ inch pipe coils for a 12 degree temperature difference, as shown in Fig. 56, page 251 of Refrigeration Theory and Applications would be about right for wall and ceiling coils. This would give a calculated heat load of 4.09 tons for the room, computed as follows:

Tons capacity

$$= \frac{4800 \times 1.96 \times 12}{2.3 \times 12000} = 4.09$$

This would be the coil capacity when free from frost. Using a service factor of 0.8, because of frost, the U value becomes 1.56. — H. G. Venemann.

New Questions

Ice Cream Hardening

Question No. 901. Our ice cream is hardened on a belt which runs through a freezing tunnel having an air blast at —30 F. Pint packages are hardened in 45 minutes. We would like to determine the probable hardening time for quart, half-gallon and gallon packages of ice cream. Is there any formula by which the performance on the smaller packages could be used to calculate the probable time required to harden these larger packages?—J. R. H.

Compressor Unloading

Question No. 902: We have 4×4 ammonia compressor on automatic control to refrigerate several small rooms. Power interruptions are frequent and the 7½ hp motor driving the compressor has burned out twice. We believe the motor is damaged because the compressor stops during power interruptions and then the motor tries to start it against full head pressure. How would you recommend that we arrange this job so that the compressor would be unloaded before the motor begins to start it?—F. W.

Relief Valve Ratings

Question No. 903: The American Standard Safety Code (B9.1) requires very large relief valves on some rather small vessels if I am interpreting it correctly. For instance what size valve is required for a low pressure ammonia suction accumulator 12 in. diameter by 4 ft long. The rated working pressure is 150 pounds. This vessel requires C = 0.5 × 1 × 4 = 2 lb per min of air discharge capacity in the relief valve. (Paragraph 13.5)

According to Paragraph 12.1.4 the discharge capacity of the relief valve shall be rated at 110 percent of the valve setting. Presumably the relief valve would be set at 150 lb with the discharge capacity rated at 165 lb. According to manufacturer's data a 1 in. relief valve with 2.8 lb per min discharge under these conditions would be required.

A ½ in. valve set to open at 125 lb would have the required discharge capacity at 165 lb. pressure. On this low pressure accumulator a 125 lb setting would be quite satisfactory from an operating standpoint and in my opinion would fulfill safety requirements. Yet the code would require that this valve be rated at 110 percent of 125 lb or 137.5 lb and on that basis it would be too small.

It seems to me the code should provide for ratings of relief valves in steps up to the pressure required for maximum opening. Then a valve could be chosen to conform in capacity to Paragraph 13.5 at 110 percent of the working pressure of the vessel on which it is installed. Would not this procedure provide safety equal to that provided by the present code requirements?—W. R. S.

Test Refrigerator Cars With Inverted U-Fins

THE National Research Council of Canada cooperated with the Canadian Pacific Railway recently in rolling three refrigeration cars of fish from Vancouver, B. C. on the Pacific Coast to Toronto, Ontario.

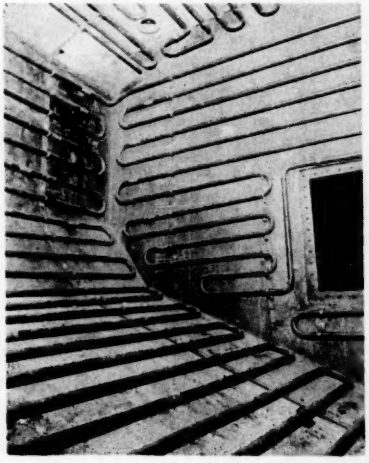
The three loadings were made up of 40,000 lb. boxed, dressed whole halibut rolling to Montreal; 30,000 lb. boxed dressed whole coho salmon; 12,000 lb. boxed whole halibut and 23,000 lb. loose halibut.

The three cars had respectively 26.23 cu. ft.; 20.93 cu. ft. and repeat, with overhead tanks with finned sections to add to the chilling area and it is thought that such maintains 5 above or zero in car air temperature in insulated cars with heavy refrigeration doors locked with compression levers. Final reports, however will be available later.

This inverted U-fin equipment increases cooling area by 15 per cent. One car was equipped with overhead tanks not having the U-fin equipment. Temperature was 4 degrees lower in the U-fin cars which is of course very satisfactory. This car was loaded with fish which came out of storage at about -15 F.

The storage company, shippers and railroad officials were very pleased with the results. Officials who were supervising and dispatching were, Chief Supervisor P. E. Brougham, perishable freight traffic and weighing service, Montreal, and G. F. Morrison, supervisor for western lines, Winnipeg, for the Canadian Pacific Railway. Bruce Robinson supervised for the B. C. Ice & Cold Storage Co. Ltd. from which plant the cars rolled.

Testing Refrigerant Piping for Tuna Fishing Boats



Each of three tuna fishing boats now being built by National Steel & Shipbuilding Corp. will contain ten of these refrigerated hatches, each of which will require 1,000 ft. of 1¼ in. pipe. Black wrought iron refrigerant piping will be installed in most of the hatches, but one boat will have several hatches fitted with galvanized pipe. The installation of both black and galvanized pipe will provide performance data to determine whether customary practice of galvanizing to protect against salt water corrosion is an economical procedure.

ENGINE ROOM POINTERS –

How to Double the Life Of a Conveyor Belt

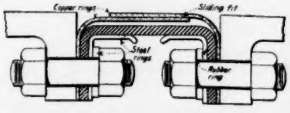
THE accompanying sketch shows how conveyor belts commonly wear—on one side. Most of the wear usually occurs during the process of loading the belt, and when the material is loaded on one side, that is where the belt wears, as indicated in the sketch.

Therefore to double the life of one of these belts simply turn it through 180 degrees. That is, using a common expression, turn it "end for end." The material then being loaded on the belt will strike and wear the unworn or "good" side.

Bearing the above in mind it is now obvious that there is an advantage in not loading a belt exactly in the center because turning such a belt through 180 degrees will do no good. A centrally loaded belt will last only about one-half as long as will a belt that is first loaded on one side and then on the other.—W.F.S.

Home-made Water-Tight Expansion Joint

REFRIGERATING plant engineers will doubtless be interested in this "home-made" expansion joint designed by a large Eastern engineering concern. It was designed in order to solve an expansion joint trouble.



The joint was made leak-proof by means of a rubber ring, as shown in the accompanying sketch. The joint is strong laterally because of the two telescoping copper rings which makes it possible for the joint to withstand considerable pressure. A joint of this kind is excellent for handling water and other fluids that will not attack the rubber. It cannot be used for high-temperature steam or water, as the rubber deteriorates under excessive heat. Nor can it be used for oil because rubber dissolves in oil.

V-Belts on Electric Motors

IN A publication by the Rural Electrification Administration of the U. S. Department of Agriculture, the following statement is made under the heading "Belt Hints." "V-belts are usually conceded to be preferable on all sizes of electric motors."

There is no question but that V-Belts are excellent belts, but from the writer's point of view he thinks the above statement should not have been made in that way. Surely the manufacturers of flat belting do not concede any such thing, and there are many more such manufacturers than there are manufacturers of V-Belting. Also there are many thousands of regular buyers of flat belting who do not concede that V-Belts are preferable. And from this writer's own experience over many years he has found that flat belting is more efficient, and on large drives efficiency can be very important. On small drives V-Belting does very well mostly because the V-belt stays in place without "jumping off."

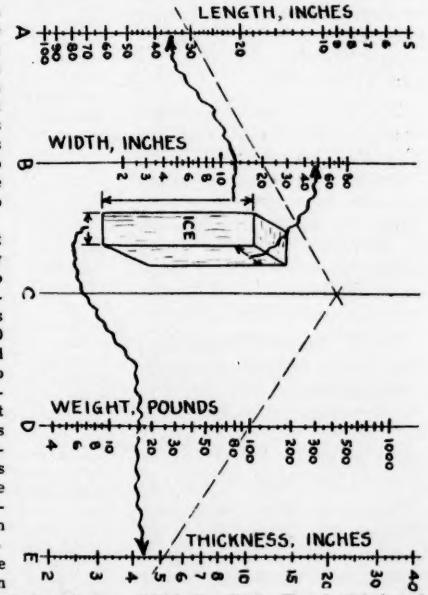
In addition there is the important matter of first cost and final cost. Flat belts have been known to last fifty years without giving any trouble.

It is true that V-Belts are being improved year after year, but so are flat belts. The writer was told by an editor about two decades ago to "stop writing articles about belt drives because that subject has been worn threadbare." But the subject isn't threadbare even yet as evidenced by the above incorrect statement by the U. S. Department of Agriculture. The writer's answer to the above incorrect statement is best put in the form of a question, namely: "Can you name a single power transmission authority who concedes V-Belts are being preferable on all sizes of electric motors?" This writer doubts that any authority on power transmission makes any such concession.—S.F.W.

How to Find the Weight of Any Block of Ice

I WONDER how much that block of ice really weighs," is a question the buyer often asks himself. And then he does nothing about it because he has no scales for weighing, or, it is "too much trouble" to remove the block of ice from the refrigerator to do the weighing.

Here is a chart that gives the weight of any block of ice from five to 100 inches in length, column A, and all widths from two inches to 80 inches, column B, and all thicknesses from two inches to 40 inches, column E. To use the chart simply zigzag across with a ruler as indicated by the dotted lines and the weight of the block of ice is immediately found in column D.



Thus for example the dotted lines drawn across this chart show that a block of ice weighing 100 pounds could be 30 inches long by 20 inches wide by 5.15 inches thick. The chart is based on the fact that a cubic foot of ice weighs 56.1 pounds.

Refrigerated Warehousing Industry

NATIONAL ASSOCIATION of REFRIGERATED WAREHOUSES

Division of American Warehousemen's Association

Executive Offices
TOWER BUILDING, WASHINGTON 5, D. C.

Executive Vice-president
WM. DALTON, WASHINGTON, D. C.

Secretary
JOS. H. COLQUITT, WASHINGTON, D. C.

Director of Information
RICHARD F. CURRY, WASHINGTON, D. C.

President
J. P. JOHNSON, WASHINGTON, D. C.

Vice-president
A. B. EFROYMSON, CLEVELAND, OHIO

Treasurer
C. E. SIMMON, OKLAHOMA CITY, OKLA.

THIS MONTH IN BRIEF

Increased servicing of trucks and growing demand for break-up space and service by frozen food distributors was reported at a meeting of the Great Lakes Chapter Association of Refrigerated Warehouses held in Chicago October 12.

Demand for additional freezer space has led the Alford Refrigerated Warehouses, Dallas, Texas to inaugurate an extensive alteration program. Part of the dry storage building will be converted to cooler space, which will make available space which has been held at cooler storage levels for frozen storage.

During September cold storage holdings increased slightly, in both cooler and freezer space. The September 30 occupancy of 80 percent was four points above average and six points above a year ago.

Poultry producers have long been aware of possible injuries to eggs resulting from improper washing. As a result, a "clean egg program" has been inaugurated by the Poultry Producers of Central California.

Great Lakes Chapter Meeting Reports Increased Servicing of Trucks

THE Great Lakes Chapter of the National Association of Refrigerated Warehouses held a regular meeting at the Edgewater Beach Hotel, Chicago, October 12. Harry Foster of Cincinnati, chairman of the chapter, presided. Plans were discussed informally to hold a joint meeting of the Great Lakes and North Atlantic Chapters, the New Jersey Association and the New York State Association of Refrigerated Warehouses December 10 and 11 in New York City. It was recommended that the National convention for 1953 be held in Florida in March or April.

A report on association activities to date was made by J. P. Johnson, N.A.R.W. president. Mr. Johnson said that generally there was good cooperation among the members of the association and that this is especially necessary in conducting negotiations with and in passing along policy information to the government. He called attention to the organizational set-up under which seven standing committees approve statements of policy issued from Washington coming under their jurisdiction. These statements, he said, reflect the opinions of members who have given them very careful study and it is their belief that they should be followed.

Reviewing legislative matters, he called attention to a Brief which the association had filed on the recent tax bill which has now been passed, and in which some of the objectionable features had been changed. Recently a farm marketing bill was passed hurriedly. This bill had several objectionable features and, later it was referred back to committee. The concentrated work done by the association was greatly responsible for the results obtained, Mr. Johnson said. Many types of bills also affected warehousing indirectly and these are being watched closely by the legislative committee.

The present situation of our government, Mr. Johnson said, should be alarming to all good citizens. Today the National debt stands at 257 billion dollars, as compared to 61 billion at the time of Pearl Harbor. This National debt is more than those of all the European governments combined. The government employs 2,507,000 workers who draw annual salaries of some 9 billion dollars. The government financing of business, he said, sets a dangerous precedent because in every case where this financing attains major proportions, it results in the government assuming control.

Turning to practical remedies, in other words, "what can be done?" Mr. Johnson suggested that vigorous objections should be interposed wherever proposal of further government encroachment in business is made, unless it is clearly necessary. All citizens should keep in touch with the activities of Congress and interpose objections or approval on any major pieces of pending legislation. Business in general should definitely curtail seeking business aid from the government, always remembering that any considerable amount of government aid leads inevitably to government controls.

General Discussion

Commenting on Mr. Johnson's report, a tribute was offered to the Washington office for its regular issuance of information. It was suggested that all members who come across information of interest to the industry should send it on to the Washington office for dissemination among other members.

Vallee Appel, reporting for the Emergency Defense Committee said this committee has a program for use in event of an emergency. Referring to Mr. Johnson's call for more cooperation, he emphasized that one adverse note in regard to a policy established by the association could cancel a lot of conscientious work done by the association through one of its committees.

Break Up Room For Frozen Foods

Considerable discussion developed on the subject of providing break-up rooms for frozen food distributors. Many warehousemen said that they

had been asked to provide such service and most of them do so. Basis of arrangement generally is to rent storage space on a square foot basis. In some cases, the warehousemen move the goods as required while in other cases, the customer does all moving with his own labor.

Generally the opinion was expressed that this service is not only popular but a good-will builder for the increasing storage of frozen food products. It is believed that demand for this service will increase, particularly from the large grocery chain stores. In some cases, it was reported some larger distributors are building their own storage and break-up room, but this is largely discounted by the increased use of such services by the smaller distributors; and bulk storage by the larger distributors will continue. The net result of this is that the refrigerated warehouse will continue to get the big lots with the smaller lots and smaller break-up deals being handled by the distributors themselves.

Truck Shipments

Truck shipments of perishable goods moving into and out of storage are increasing, it was brought out in a discussion of this subject. The volume of such goods exceeds rail shipments and it is increasing. While many of the older refrigerated warehouses were designed for rail shipments, they are gradually arranging their set-up to provide more and more truck unloading and loading service.

Considerable discussion was held on the subject of accepting merchandise, at or near the closing hour. The general practice seems to be that such merchandise will not be accepted if in a refrigerated truck. If not in a refrigerated truck, the general practice is to unload the truck.

Finances

In an informal discussion of National Association finances, it was brought up that increased services has necessitated increased expenditures and that the association will either have to find additional income or curtail some of the services. Individual contributions have been arranged and it is thought that this will take care of the situation at least temporarily.

Representatives of the Membership Committee reported that the prospective membership list is up-to-date and that plans are being continued to draw in new members. All those who knew of new concerns in their territory were asked to advise the committee or the Washington office. Among plans being developed at Washington are to have members make personal visits to prospects in their immediate vicinities.

A report of a study on in-and-out handling costs was presented. While these figures are typical, it was explained that they cannot be standardized throughout the industry because each house has different conditions such as having to truck some commodities further than others, use of elevators and other typical local conditions.

Although palletizing with mechanized handling is generally accepted throughout the industry as the more modern practice, the older multi-story houses report that palletizing has resulted in about 35 per cent loss of space and while it has saved some labor costs, the net financial loss is about 15 per cent. However, another factor is that the shortage of labor and the practical impossibility of getting enough labor to move the goods, makes palletizing with mechanized handling practically a necessity.

Occupancy

Discussing occupancy, it was brought out that both freezer and cooler space are short in some sections. Calling the roll of commodities, it was shown that some are up and some are down but the picture as a whole seems to indicate very favorable occupancy for some months to come. Among the new products mentioned were wet cell automobile batteries and plastics.

A discussion of insurance brought out the fact that legal liability can be obtained at a reasonable rate and is valuable in providing peace of mind for the management. It was suggested that it is highly desirable to have each group confined to one insurance company. It was suggested that the most convenient way to handle insurance problems is to turn them over to an insurance specialist.

The get-together was concluded with a very enjoyable cocktail party followed by dinner in the Marine Dining room of the Edgewater Beach Hotel.

Costa Rica New Methods

COSTA RICA has adopted U.S.A. commercial frozen broiler methods and shipping south into the Canal Zone and South America. Since ECA began, some 3,000 European specialists have visited the United States to study production methods.

Warehousemen Hold Joint Meeting in Canada

A JOINT meeting of the Canadian Warehousemen's Association, the New York State Association of Refrigerated Warehouses was held at the Hotel General Brock, Niagara Falls, Ontario, Canada, September 20 and 21, 1951. Joseph A. Whitmore of the Canadian Warehousemen's Association, Toronto, Canada, acted as General Chairman for this International Meeting and called the opening session to order Thursday morning, September 20.

The speakers who offered presentations during the two-day meeting were: Francis Blake, Sr., Growers Cold Storage, Waterport, N. Y.; Ernest P. Carr, Howell Warehouses, Ltd., Toronto, Ontario; P. Cassells, Terminal Warehouses, Ltd., Toronto, Canada; William Dalton, Executive Secretary NARW, Washington, D. C.; W. Dennis Day, Terminal Warehouses, Ltd., Toronto, Canada; Richard R. Doncaster, Holley Cold Storage, Fruit & Produce Co., Holley, N. Y.; Louis B. Duff, Financier and Author, St. Catherine, Ontario; Herbert F. Earels, Canadian Cartage and Warehouse Co., Buffalo, N. Y.; Crawford R. Johnson, Canada Cold Storage Co., Ltd., Montreal, P. Q.; Jerry P. Johnson, NARW President, Terminal Refrigerating & Warehousing Corp., Washington, D. C.; Rob Roy McLeod, Niagara Mohawk Power Co.; Garth A. Shoemaker, Hygeia Refrigerating Co., Elmira, N. Y.; J. R. Shoemaker, Hygeia Refrigerating Co., Elmira, N. Y.

Richard Doncaster of Holley, N. Y., was chairman for the American group and Francis Blake, Jr. of Waterport, N. Y., supervised arrangements for a conference golf tournament. Canadian officials Whitmore, Johnson and Carr were most effective in their efforts and their welcome.

Uniform Safety Code For Warehouses

THE committee on Insurance and Safety for the National Association of Refrigerated Warehouses has been assigned the job of developing for the industry ideas around which a uniform safety code for refrigerated warehouses may be designed. In a recent meeting with committee chairman A. Gordon Janney, President Jerry P. Johnson of the N.A.R.W. stressed the desirability of encouraging more widespread practice of accepted principles of industrial safety among refrigerated warehousemen. The basic factor involved is protection of the industry's employees and its property.

Clean Egg Program Produces Better Eggs

L. N. THOMPSON
Manager Egg Department
Poultry Producers of Central California

FOR many years, Poultry Producers of Central California has been keenly conscious of the potential injury to egg quality resulting from improper ranch washing of eggs. Recognizing the extreme difficulties of maintaining comparatively sterile conditions in a farm egg washer, the Association emphasized the risks involved in washing eggs and the advantages of greater production of clean eggs. Initially, in an attempt to reduce the unfavorable aspects of widespread ranch egg washing, the Association urged its members to confine washing operations to heavy dirty eggs, to dry-clean whenever practicable, and to segregate and mark all washed eggs so they could be handled separately in marketing channels.

Losses Reach Peak

The development which necessitated positive action and resulted in the Association's present program were two-fold: First, storage losses increased, became considerably greater than normal, reached a peak in 1948, and although reduced somewhat in 1949 and 1950 by segration of washed eggs, were still of serious consequence; second, the Association was receiving too many reports from consumers of "sour eggs" (caused by Pseudomonas contamination) among fresh egg packs, the latter attributable to the rapid development of Pseudomonas even under cool holding temperatures. This latter constituted a very real threat to consumer acceptance of, and preference for, the Association's NuLaid AA quality brand.

Accordingly, a "clean egg program" was initiated in the first week of January, 1951, in which members were paid a premium of 45 cents per case for clean, unwashed eggs. The funds are derived from assessments on all deliveries of dirty or washed eggs. This system of premium payment for clean unwashed eggs has been paralleled by an educational program informing members of the dangers to egg quality that stem from careless management practices resulting in the production of dirty eggs.

Emphasis is on the production of clean eggs and the fact that the egg that never got dirty in the first place is the best "clean" egg. Association members appreciate the importance of the price premium for eggs of high quality. This quality can be preserved only by the production of a high percentage of clean eggs, and the dry cleaning of dirties, methods which minimize contamination, and which have been shown to reduce Pseudomonas contamination.

The average of PPCC clean, unwashed receipts has risen from 44.52% (plant range from 31.84 to 68.71 per cent in the week ending January 6, to an average of 61.48 per cent (plant range from 46.93 to 82.82 per cent) for the week ending June 30— an increase of 38 per cent. Part of this increase is attributable to the seasonal change in weather conditions; part of it to replacement of egg washers by dry cleaning machines; even more may be traceable to watchful management practices resulting from educational efforts.

When Sell Eggs by Grade Quality Improves

OHIO farmers when paid for eggs according to quality, as measured by official grades, make an extra effort to produce better eggs. Egg handlers in the State using the Federal-State official grading service increased the percentage of eggs marketed in the top grades in eight years from 55.6 per cent to 74.5 according to a report by the U. S. Department of Agriculture.

The study, conducted with funds provided by the Research and Marketing Act, was made by the Cooperative Research and Service Division of the Farm Credit Administration. It is published as Miscellaneous Report 153, "Some Effects of Marketing Eggs in Ohio According to Official Grades."

In 1950, the 26 organizations using the official grading service handled 26 per cent of the eggs marketed from Ohio farms. The volume of eggs graded by the Ohio Federal-State egg-grading service increased from 14,000 cases in 1932 to 1,677,690 cases in 1950.

Six cooperatives market about 13 per cent of the eggs sold by farmers in Ohio. These cooperatives accounted for about 52 per cent of the eggs officially consumer-graded in 1950. They increased their percentage of consumer graded eggs in top grades from 78.6 in 1934 to 86.3 per cent in 1947.

Refrigerated Warehousing

Southwestern Chapter Hears Talk on Legislation

AT A MEETING of the Southwestern Chapter of N.A.R.W. in Fort Worth, President Johnson pinpointed his presentation on national legislation with the comment that "our efforts in your behalf in Washington and elsewhere throughout the nation will be successful only in proportion to your help, your cooporation, your support." Never has it been more vital that our activities legislative and government-wise command that support—stemming from the "grass roots." Wm. Dalton, executive vice-president also spoke along the same line.

Officers were re-elected for another term as listed below:

Chairman, C. P. Metcalf, Southwestern Ice and Cold Storage Co., San Antonio, Texas.

Vice Chairman, C. M. Smith, Merchants Ice and Cold Storage Co., San Antonio, Texas.

Secretary-Treasurer, S. C. Wentworth, Scobey Fireproof Storage Co., San Antonio, Texas.

Cooke Warehouse Corp. Adds New Facility

ANNOUNCEMENT has been made by Frank E. Kearney, vice-president of the J. Leo Cooke Warehouse Corp., that negotiations have been completed with the Erie Railroad whereby the company will acquire an additional warehouse facility in Jersey City.

In discussing this new facility J. Leo Cooke, president of the company which bears his name, advises that this facility was acquired due to the demands of the customers and prospects of the warehouse company for a facility on this railroad. This is another step in the announcement made at the formation of the company on January 1, 1950, that a national chain of warehouses was contemplated under this operation. The new facility now available for receiving of freight, will be known as the J. Leo Cooke Warehouse Corp.

Quincy Market Plans Maine Warehouse

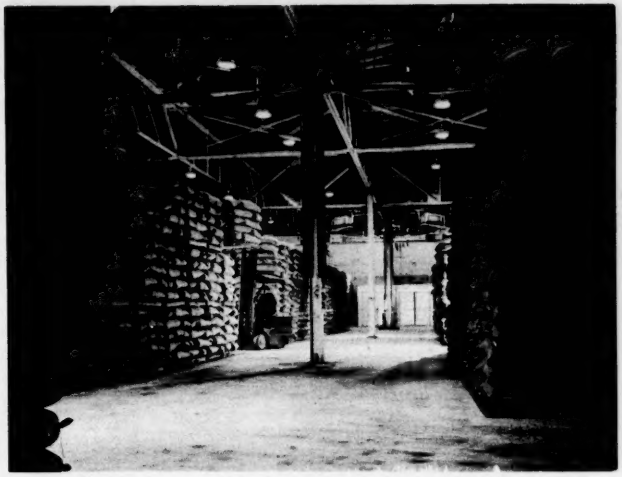
THE Quincy Market Cold Storage Warehouse Co., Boston, has acquired a site for a million dollar quick-freeze plant and warehouse at Portland, Me. The City Council voted to sell 120,000 square feet of suburban land to the Company, which was high bidder at $3,500.

Alford Expands Refrigerated Space

INCREASED demand for freezer storage space has caused Alford Refrigerated Warehouses at Dallas to begin alterations to meet the need—only eighteen months after completion of the big storage center.

The alterations will demonstrate the flexibility that was originally designed into the plant. When President Fred F. Alford decided to build, he determined that his plant must be able to change—at low cost—to meet changing conditions in the industry. While he did not undertake to predict what changes would occur in the industry, Mr. Alford knew he was safe in predicting changes of some kind; therefore the flexible design.

The present changes will add 1,375,000 cubic feet of cooler space by converting part of the dry storage building. This will make available space in the frozen storage building which has been held at cooler storage levels.



Good care of stored goods in Alford Warehouses calls for these neat stacks of material on wooden pallets. Wide aisles simplify maneuvering on fork lift trucks. The ceiling type refrigerating units are visible in circular groups above the aisle.

Basic Ideas

In building the warehouses, Mr. Alford saw an opportunity to realize an ideal, the essentials of which were:

1. Plenty of space for immediate use, with room for future enlargement, plus the necessary flexibility to put his storage rooms to the most servicable and profitable uses.

2. A location with adequate railroad trackage and dock space, and room for all the trucks that it would be necessary to accommodate at one time.

3. The best in railroad and highway connections to avoid congestion, plus quick access for local customers.

4. This essential is the result of all the others; it ranks first with the Alford Refrigerated Warehouses: Efficiency so highly developed that service to customers shall be the unfailing and natural result.

Warehouse Essentials

Let's take Mr. Alford's ideal warehouse essentials in order, and learn how the plant fits them.

1. The new plant is on a sixty-acre tract. Present construction uses only twenty acres. That leaves plenty of room for future growth. Indications are that it will be needed. Although the population his increased tremendously in Dallas and the Southwest in the last twenty-five years, there was less warehouse space in the area than there was a quarter-century ago, until the Alford warehouses opened.

2. Railroads: Spur trackage against the docks holds eighty freight cars. Parallel storage tracks hold another eighty—total 160 cars at the warehouse at once.

Trucks: Three hundred large over-the-road trucks can be accommodated at the Alford plant at once. They reach the docks over a private street, 100 feet wide, allowing plenty of room for maneuvering without interference from public traffic.

3. Again, consider railroads first: The plant is on the main line of the Rock Island Railroad. It is adjacent to the interchange yard of the ten railroads serving Dallas. It is on the Southern transcontinental all-weather route.

Trucks and quick access for local customers: The Alford tract is less than a mile from the center of the Dallas business district. It fronts on three streets that connect directly with major national and state highways.

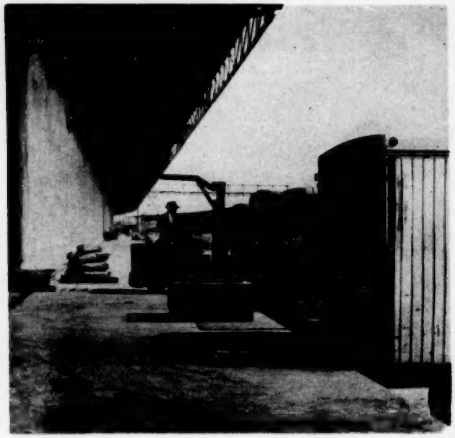
4. "As our organization sees it, service to customers has two parts," Mr. Alford says. "First, there is the receiving, storing and removal from storage. In the middle of this is care. We must be fast in receiving and discharging merchandise to save the customer's time. We must care for his goods so well that they are returned to him in the same condition as he left them."

"When a customer brings merchandise to us," Mr. Alford says, "we handle it only once—putting it from his truck to our pallets. Our fork lifts carry it into its assigned place. The goods stay on the pallet. When it is ordered out, the fork truck again does the job. When it reaches the dock, the goods may be taken from the pallets and put on the truck or railroad car. In many instances our local customers have us run the loaded pallets into their trucks. They return them later, either empty or loaded with another consignment for storage."

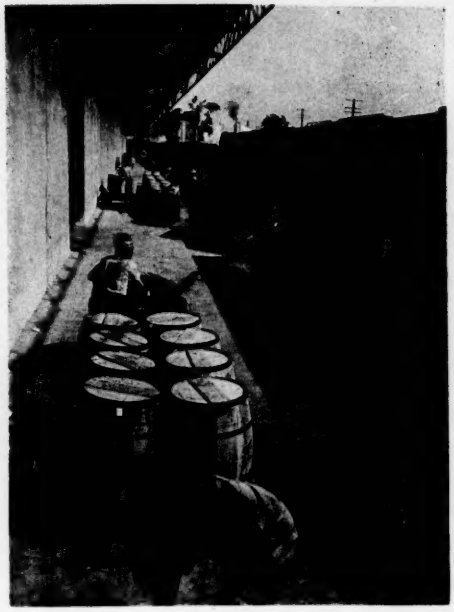
Hechanical Handling Saves Time

"This mechanized handling enables us to time the delivery of merchandise in seconds or minutes instead of hours. The customer gets his merchandise quickly. That's what he wants, especially when circumstances arise that make a quick delivery necessary.

"For example, suppose a local customer telephones us that he is sending a truck for a hundred cases of eggs. We tell him where to spot his truck. By the time the truck arrives we have the eggs waiting. That kind of service is necessary to keep the good will of customers in this time of high speed. It will be more necessary in the coming time of high competition."



Above, the full length truck platform provides ample space for fork lift trucks to store or deliver the goods to the truck carriers.



Right, mechanized operation of Alford Refrigerated Warehouses calls for this type operation where tractor pulls trailer load of goods into storage.

Present Expansion

Originally the Alford warehouses consisted of two buildings, one of seven and a half million cubic feet of frozen storage space, the other eight million cubic feet of dry storage. The dry storage building was air conditioned to hold temperatures down to 70 degrees. But both warehouses were fully insulated for future conversion to meet changing needs.

Thirty Recold ceiling units of the blower type have been delivered for the present conversion of a room 250 by 220 feet with an average ceiling height of 25 feet. It is estimated sixty tons of refrigeration will be required. The new coils will be used in conjunction with the units which were originally installed and which now air condition the room.

Cold brine will be pumped to the rooms from the main engine room. The machinery was engineered to care for the increased load. Walls and ceilings of the room are insulated with twelve inches of shredded Redwood bark.

President Alford says the new room will make available space for up to 25 million pounds additional frozen food, depending on the density of the product.

Besides the Recold units already delivered, Mr. Alford has on order for future delivery thirty more units. These will be used for more cooler space or to increase the sharp freezer capacity. Their use will be determined by conditions and needs at the time of arrival. Brine lines in the room now being converted are big enough to carry two more rooms of the same size.

Fact Finding Conference to be an Industry Wide Sales Meeting

THE 1952 Fact Finding Conference of the Institute of Poultry Industries will be an industry-wide 'sales meeting' " announced Edward Priebe, Jr., chairman of the board of the Institute. By that he means that they will place a lot of emphasis on dressing up plain facts with dramatic presentations, so industry will find them interesting, easy to use, and profitable. The Conference will be held February 10, 11 and 12, 1952, in the Municipal Auditorium at Kansas City, Mo.

Two thousand producers, processors, hatcherymen, feed manufacturers, college and government representatives, and other industry people are expected to be on hand for these big days, to see, hear and talk over the latest developments in chicken, turkey and egg production, marketing and merchandising.

Registration and exhibits will open at 10 o'clock Sunday morning, February 10. The Conference program will open Sunday afternoon with a general session built around Washington activities that affect poultry and egg operations.

A shell egg and egg products clinic is scheduled for Monday morning; a production and procurement clinic Monday afternoon; a plant operating clinic Tuesday morning; and a merchandising clinic Tuesday afternoon.

The 1952 Conference exhibit will be larger than 1951, and more products used in producing, processing and packaging chickens, turkeys and eggs will be displayed. Present plans also include a mass industry merchandising display, showing the wide variety of poultry and egg products now on the market, plus outstanding advertising copy and promotion and sales material which individual firms have found to be particularly effective.

The traditional Institute open house Sunday evening, February 10, will feature a number of popular chicken and turkey items buffet style. And the menu for the conference banquet Monday evening will feature turkey broilers, custom grown and processed especially for this event, and cooked according to a special recipe prepared by the Poultry and Egg National Board.

September 30 Cold Storage Holdings

A SLIGHT increase in cooler space utilization during September raised cooler occupancy in public refrigerated warehouses to 66 percent on September 30. Average occupancy for this time of year for the 5-year period ended September 30, 1950 was 68 percent while a year ago the cooler occupancy level was at 63 percent.

Regionally, cooler occupancy equaled or exceeded the national average in the East North Central, West North Central, South Atlantic, and East South Central areas.

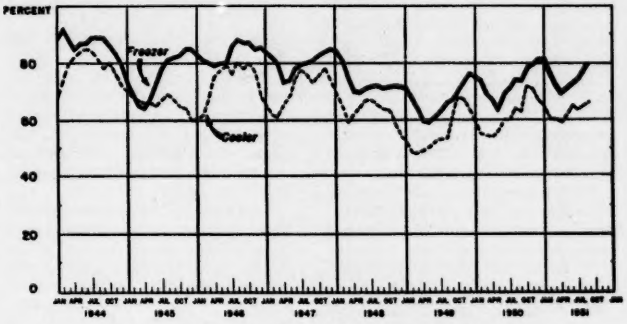
A two-point increase in freezer occupancy during September was the greatest increase for this time of year since 1943 when a 3-point gain was reported. The September 30 occupancy level of 80 percent was 4 points above average and 6 points above the September 30, 1950 level. Increased freezer space utilization was reported for all regions except the West North Central and South Atlantic. Cities having a cooler and freezer occupancy of 80 percent or better were Buffalo, Norfolk, Nashville, and Memphis.

Stocks of commodities in refrigerated warehouses on September 30 totaled 3.8 billion pounds. Stocks in coolers amounted to 1.7 billion pounds while freezer held items totaled 2.1 billion pounds. Cooler weights reflected a nine percent increase whereas freezer weights showed a one percent decrease during September. Net into-storage movements of fresh apples, canned fruits and vegetables, beef, and miscellaneous commodities accounted for the cooler weight increase. For freezer foodstuffs net in-movements of frozen fruits, vegetables, poultry, sausage, lamb and mutton, and veal were slightly outweighed by net withdrawals of other freezer commodities.

Seasonal gains in fresh apple holdings brought the total to 7 million bushels by September 30 which compares with a like amount in storage last year. Pear stocks were down from the previous month to 5 million bushel but were still greater than last year's holdings by a million bushels.

Seasonal increases were reported in stocks of canned fruits and vegetables, onion, celery, and other fresh vegetables while stocks of potatoes, dried and evaporated fruits, nutmeats, unshelled peanuts, and tree nuts in shell all reflected net seasonal decreases.

National holdings of frozen fruits in storage showed a net increase of 4 million pounds during September which was about half the average gain for this time of year. However, with 385 million pounds on hand September 30, current stocks were five percent greater than the 5-year average holdings and 14 percent greater than supplies on hand last year. Much of the seasonal gain in frozen fruit stocks were accounted for by net increases in stocks of peaches, blueberries, plums and prunes since such other fruit items



Occupancy of Refrigerated Warehouses, 1944-1951

TABLE I—COLD STORAGE HOLDINGS IN PUBLIC, PRIVATE AND SEMI-PRIVATE WAREHOUSES, APPLE HOUSES AND MEAT PACKING PLANTS (000 LBS.)

	Sept. 30, 1951	Aug. 31, 1951	Sept. 30, 1950	Five-year Average
Meat and meat products, lbs.	505,483	605,151	410,280	355,219
Lard and rendered pork fat, lbs.	27,887	34,702	58,241	71,840
Frozen poultry, lbs.	164,952	121,493	140,352	154,317
Creamery butter, lbs.	113,617	116,790	234,111	126,652
American cheese, lbs.	235,036	233,788	292,421	190,773
Other cheese, lbs.	23,765	26,610	26,743	25,828
Shell eggs, cases	931	1,615	1,558	2,840
Frozen eggs, lbs.	151,991	176,273	133,002	175,890
Apples, bu.	7,215	293	7,321	9,480
Frozen fruits, lbs.	384,508	380,264	338,074	366,999
Frozen vegetables, lbs.	504,820	445,724	430,576	356,359
Frozen fish, lbs.	164,391	161,628	158,473	146,439

TABLE II—PERCENTAGE OF SPACE OCCUPIED BY PUBLIC COLD STORAGE WAREHOUSES (APPLE HOUSES EXCLUDED)

	Net Piling Space (000 cu. ft.)		Sept. 30, 1951 (%)		Aug. 31, 1951 (%)		Sept. 30, 1950 (%)		5-year Average (%)	
	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer
New England	2,940	6,110	50	91	36	87	55	76	65	75
Middle Atlantic	35,346	32,158	60	84	56	83	54	81	62	80
East North Central	26,868	23,666	75	79	76	77	72	72	72	74
West North Central	8,372	13,322	66	71	65	75	77	75	76	74
South Atlantic	8,955	6,494	68	79	67	80	57	71	65	76
East South Central	2,809	3,178	89	87	72	87	83	86	83	83
West South Central	6,951	7,408	62	63	65	61	60	58	64	60
Mountain	1,315	1,443	47	85	53	72	56	80	80	56
Pacific	14,139	19,706	63	84	69	77	58	72	77	58
United States	107,695	113,485	66	80	65	78	63	74	76	63

TABLE III—PERCENTAGE OF SPACE OCCUPIED BY PRIVATE AND SEMI-PRIVATE REFRIGERATED WAREHOUSES AND MEAT PACKING PLANTS (APPLE HOUSES EXCLUDED)

	Private and Semi-Private Warehouses						Meat Packing Establishments					
	Net Piling Space (000 Cu. Ft.)		Space Occupied—Per Cent Sept. 30, 1951		Aug. 31, 1951		Net Piling Space (000 Cu. Ft.)		Space Occupied Sept. 30, 1951		Aug. 31, 1951	
	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer
New England	8	21	56	81	..	..	.....	.....	..	..	..	..
Middle Atlantic	1,457	1,605	64	88	26	87	1,861	258	86	58	84	86
East North Central	6,849	5,774	64	45	54	44	4,387	1,499	83	80	84	90
West North Central	403	1,494	67	68	90	69	12,163	5,867	86	68	91	79
South Atlantic	576	4,637	25	76	22	77	962	239	86	98	86	100
East South Central	.....	.....	..	..	..	..	557	124	82	91	89	86
West South Central	115	116	69	91	80	89	612	501	97	100	100	100
Mountain	102	41	98	95	97	30	580	412	99	100	89	98
Pacific	3,386	4,550	42	87	40	80	2,723	489	89	95	88	89
United States	12,896	18,238	56	69	46	67	23,845	9,389	87	74	89	84

NOTE:—Blank spaces indicate that insufficient returns were received.

as apples, cherries, raspberries, and strawberries each reflected seasonal net decreases during September.

Frozen vegetable stores were up 59 million pounds since August 31 and by the end of last month totaled 505 million pounds. This compares with 356 for the 5-year period ended 1950. Current stocks of frozen vegetables exceeded all previous monthly records as sharp seasonal gains were reported in holdings of lima beans and sweet corn. The latter was almost twice the amount in store the previous month while the former was more than twice the August 31 stores. Orange concentrate holdings were reduced 2 million gallons during September and by the end of the month amounted to approximately 15 million gallons.

A greater than average net seasonal decrease in cream stocks brought the national total down to 40 million pounds which compares with 16 million on hand last year and 54 million in store on September 30 for the 5-year period ended 1950.

Approximately half as much butter moved from storage during September as did during the 5-year average period. Total holdings of 114 million pounds compares with 234 million stored last year and average September 30 stocks of 127 million pounds. East North Central storages held approximately 38 million pounds while the West North Central storages had 41 million pounds which collectively accounted for almost 70 percent of the national supply.

Shell eggs in storage were reduced to 931,000 cases by September 30 which was the second lowest on record for this time of year.

Frozen eggs on hand amounted to 152 million pounds as net withdrawals of 24 million pounds were reported during September. These stocks were 14 percent below the September 30 average and 14 percent above supplies on hand last year. Illinois holdings of 26 million pounds and 22 million pounds in Missouri accounted for almost a third of the total stocks. The combined total in East and West North Central States were 96 million pounds.

American cheese stocks reflected slight gains during September and totaled 235 million by the end of the month. By comparison, last year's stocks were 292 million pounds while average holdings for this time of year were 191 million pounds. Government-owned stocks of American cheese were 870,000 pounds.

Poultry gains, twice the September average (43 vs. 21, brought national stores to 165 million pounds by the end of the month. Middle Atlantic and East North Central storages were almost evenly divided with each reporting approximately 43 million pounds. Stocks in the West North Central States totaled 30 million pounds while 21 million pounds were in the West Coast. Turkeys increased during September to 40 million pounds as compared with 43 million on hand last year. Average September 30 stocks were 35 million pounds. Of the total turkeys in store 11 million pounds were in the West Coast and 10 million in the Middle Atlantic States.

Total September 30 supplies of 505 million pounds reflected a seasonal decline of 100 million pounds during the month. Last year with 410 million in store, the seasonal decline was 56 million pounds. Classification-wise, beef holdings at 94 million pounds remained comparatively unchanged from the previous month; pork decreased to 312 million pounds; other meats declined to 100 million pounds.

The net change in pork stocks was greater than average for this time of year, 90 million as compared with 81, while last year net withdrawals totaled 63 million pounds. Lard and rendered pork fat on hand September 30 was reduced to 28 million pounds which was about two-fifths the average September supply and a little more than half the stocks on hand last year.

September seasonal gains in storage stocks of fishery products brought the national total to 201 million pounds of which 164 million were frozen fish. Frozen fishery products gained about 3 million pounds during September.

Storage Outlook

Cooler utilization gained a point during September which reflected the net into-storage movement of fresh apples. Further gains should prevail during October as apples continue to move into storage. Normally, the seasonal peak is reached by the end of October and if the historical pattern prevails, the expected increase should bring cooler utilization to 70 percent or better. Freezer occupancy by September 30 was at the highest level reported for this time of year since 1947. Significant amounts of frozen vegetables and poultry moving into storage undoubtedly accounted for the greater than average seasonal gain and as a result freezer space in certain areas was operating at near capacity levels. Freezer occupany should continue to rise and by October 31 may be at least two percentage points above the September 30 level.

Canadian Holdings of Fruits and Vegetables

THE Dominion Bureau of Statistics of Canada, Agricultural Branch, reports the following commodities held in cold storage on September 1, 1951.

Frozen fruit holdings in storages and factories September 1, 1951 amounted to 23,627,000 pounds as compared with 19,906,000 pounds August 1, 1951 and 19,171,000 pounds September 1, 1950.

Stocks of frozen vegetables in storages and factories on September 1, 1951 amounted to 13,791,000 pounds as compared with 8,034,000 pounds August 1, 1951 and 10,399,000 pounds September 1, 1950.

Frozen Foods

*Reg. U. S. Pat. Off.

PREPARATION PACKAGING FREEZING STORAGE DISTRIBUTION DESIGN CONSTRUCTION EQUIPMENT

Banker Impressed by Future of Frozen Foods

THERE is no longer justification for associating frozen foods with frozen loans, according to Ivan R. Bean, vice-president of the Bank of America. In an article entitled, "Frozen Foods—Frozen Loans (?)," published in the Robert Morris Associates Bulletin, Mr. Bean carefully examines the development and present status of the frozen food industry and concludes that with the progress now achieved, "it is reasonable to expect that where justifiable credit is extended to frozen food processors, repayment will be as orderly as any similar credit extended to members of any other industry."

Mr. Bean's article traces the early development of the frozen food industry, the problems that have been faced, and discusses the remarkable expansion in production and distribution that has been achieved. He does not neglect mentioning the difficult period through which the industry passed in the mid 40's, but ends this discussion as follows: "After the dust settled, however, there was found a financially healthier industry, and the bankers had another credit lesson under their belts."

In the course of his article, Mr. Bean devotes considerable space to discussing the credit requirements of the industry, and outlines various factors which bankers must consider in appraising applications for loans from frozen food packers.

In summing up, Mr. Bean takes a very optimistic attitude toward the future of the fozen food industry. As he sees it:

"The frozen food industry has overcome what appeared to be insurmountable obstacles. Thought has been applied to every phase of the operation, from selecting the type of seed to educating the consumer in the proper preparation and use of its product. This industry, even more than others, recognizes there is still a big job to be done. But it can be congratulated on its attainments to this time, for now it can rightfully claim that the industry produced a major food service to modern living. With a continuation of the energy, courage and resourcefulness shown to date, it is reasonable to expect further rapid growth."

Western Frozen Food Packer Reports Increased Profits

WESTERN FROZEN FOODS CO. Inc., Watsonville, Calif., realized a net profit of $82,117 on sales of $1,703,387 for the fiscal year ended June 30, President L. J. Campodonico has announced. The performance compared with a net profit of $23,611 on sales of $1,530,365 the year before.

This is the third consecutive year in which sales have increased, earnings have been better, and the financial condition of the company has been improved, Campodonico observed.

Production of frozen vegetables totaled 9,392,850 pounds in the 1951 fiscal year, compared with 6,951,792 pounds the year before. Sales of frozen vegetables totaled 8,909,230 pounds against 7,083,774 pounds. Frozen vegetable inventory at June 30 totaled 1,313,846 pounds compared with 729,078 on the same date a year ago.

Frozen Green Pea Pack Increases Thirty Percent

THE pack of frozen green peas was 197,542,671 pounds in the 1951 season, according to a preliminary tabulation completed by the National Association of Frozen Food Packers. This 1951 pack total is nearly 30 per cent greater than production last year, and exceeds by an even wider margin the volume of frozen peas packed in any earlier year.

All producing regions participated in this tremendous pack increase, but the biggest gain in tonnage was reported for Western states. The increase there was more than 32 million pounds, and brought the 1951 pack total for this region up to nearly 135 million pounds.

Container-size usage in the 1951 pack of frozen peas was somewhat different than last year. Retail sizes again were the dominant container, but this year more than 18 million pounds were packed in the 10 oz. size. In 1950, the pack in the 10 oz. size was negligible. The major part of the 1951 retail pack still went into the 12 oz. size, however, with the total for this size amounting to some 102 million pounds.

The pack in small institutional sizes (over 1 lb. through 10 lbs.) was slightly greater in 1951 than last year, but the increase was not proportional to the over-all pack increase.

The pack in large sizes, over 10 lbs., was much greater this year than in 1950. It is probable, however, that a part of the 1951 volume now included in reported totals for sizes of over 10 lbs. will ultimately be used for mixing with other vegetables, so that final 1951 pack totals for large container sizes will be smaller than now indicated.

Revised Standards of Frozen Spinach

THE U. S. Department of Agriculture has anounced a revision, effective October 25, 1951, of U. S. standards for grades of frozen spinach. The revised standards will supersede those which have been in effect since November 9, 1947.

The grades of frozen spinach, which have been broadened to cover the whole leaf and chopped styles, are designated as U. S. Grade A or Fancy; U. S. Grade B or U. S. Extra Standard; and Substandard. The factors of color, character, and absence of defects are considered in conjunction with other requirements in ascertaining the grade of the product.

The revised standards are the result of studies conducted by the Department, and of recommendations which have been received by the Department from the industry. Their use is voluntary.

Swedish Ship Brings Frozen Tuna from South America

NEW refrigerated ship service is being operated to the Pacific Northwest under the Swedish flag—the tiny refrigerated motor-vessel the "Christina", only 166 ft. long overall, arriving in September at Astoria, Ore., with frozen tuna from the Panama Canal Zone, to initiate the new refrigerated service. The "Christina" is one of a pair of sisterships that the Universal Line of Stockholm, will operate in regular monthly service between the west coast of South America, and our own west coast, bringing in frozen fish and taking back general cargo.

Standards for Peas and Frozen Diced Carrots

UNITED STATES Standards for Grades of Frozen Field Peas and Frozen Black-Eye Peas and frozen diced Carrots have been issued by the Production and Marketing Administration of the United States Department of Agriculture. These standards have been issued after careful consideration of all data and views submitted by individual members of the industry, trade associations, and from other sources. They were published in the Federal Register on September 14, 1951 (16 F.R. 9300) and became effective October 15, 1951.

They are designed to serve as an aid in packing and as a convenient basis for sale in wholesale transactions and as a basis for determining loan values. They will also serve as a basis for the inspection of this commodity by the Federal inspection service, which service is available for inspection of other processed products as well.

A.S.H.V.E. Moves Office

THE American Society of Heating and Ventilating Engineers moved its headquarters from 51 Madison Avenue, New York City, to 62 Worth Street on October 1, it was announced by A. V. Hutchinson, executive secretary of the society. He said the growth of the society, whose membership has virtually tripled in the past decade, made the present space, occupied since 1930, inadequate.

"The change will enable the society to serve the requirements of today's membership, meet the needs of growth expected in the future and assure pleasant working conditions for personnel," said Mr. Hutchinson. The new offices, occupying the entire fourth floor at the Worth Street address in a building recently renovated and air conditioned, will take up about 2,750 square feet of floor space as compared with approximately 1,600 square feet at the present quarters on the 30th floor of the New York Life Insurance Building.

The new location is near Broadway, not far from the municipal and court center of New York, and conveniently accessible by various forms of transportation. This is only the third time the Society has moved its headquarters in 40 years and in each instance it was made necessary by substantial increase in membership. From 1911 to 1930 the headquarters were in the Enginering Societies Building, New York, and membership increased from 400 to 2,000.

Brownsville Calling for Refrigeration Specialists

A RECENT official survey by the Board of City Development reveals that an opportunity exists in Brownsville, Texas, for a consulting refrigeration engineer.

An increase in the number of quick-freeze plants and the ever increasing number of refrigerated boats of the shrimp and fishing fleets based at Brownsville were listed as two contributory factors in the city turning up short-handed in this type of specialist.

The advent of the major portion of the Gulf Coast shrimp fleet and the resultant construction of facilities to handle the vast tonnage of sea-food now clearing through this port, together with the natural increase in other lines of refrigeration make the opportunity for a highly qualified specialist attractive.

Interested parties are requested to contact the Board of City Development, Brownville, Texas, for further information. Maximum assistance will be rendered.

Brownsville, a city of about 50,000 including suburbs, is located opposite the Mexican City of Manamoros, Tamps., of similar size, 30 miles from the Gulf of Mexico. Transportation facilities include the deep water inland Port of Brownsville; the terminus of the Intracoastal Canal; three railways (including the Mexican National system) 2 bus lines and a dozen air freight passenger lines using the International Airport. A new highway links the town to the Pan American Highway at C. Victoria, Mexico. The area has developed rapidly in the last 10 years.

Weather is semi-tropical with light rainfall and an average temperature of 73 degrees. The city has a daily newspaper, two radio stations, a modern hospital, a junior college and good recreational facilities.

Virginia Apple Storage Shows Increased Volume

COLD storage plants of Winchester, Va., and vicinity report approximately 211,585 bushels of apples stored to date. Largest holdings are at Winchester Cold Storage Company, 129,000 bushels, which is about 15,000 ahead of the same date last year. In general, the quality of the fruit is up to expectations, the storage men and packers say. There are few borderline apples, said one packer; they are either very good or very bad. H. W. Butler, Jr., said there are indications that the total crop in the area will be smaller than expected.

Missouri Plant Adds Service

(Continued from page 37)

Blower fans, each handling over 7000 cubic feet of air per minute. V-belt drives connect these fans with 3-hp. motors.

For air conditioning the office, 24 gallons of water per minute are cooled through a range of 10 F in one of two large Instant water coolers. This air conditioning load amounts to 10 tons of refrigeration. Another load carried by the same zig-zag coolers chills 16 gallons of water a minute from 85 to 35 F.

Tax Amortization Issued Anhydrous Ammonia Plants

CERTIFICATES of necessity for accelerated tax amortization on new or expanded facilities for production of anhydrous ammonia have been issued by the Defense Production Administration to the following concerns:

The Atlantic Refining Company, Point Breeze Philadelphia Refinery; applied for $3,400,000 of which 50 per cent was certified.

Lion Oil Company, Charlotte, N. C.; applied for $30,516,000 of which 50 per cent was certified.

Food Machinery & Chemical Co., South Charleston, W. Va.; applied for $2,503,000 of which 50 per cent was certified.

Woodward Iron Co., Woodward, Ala.; applied for $6,000,000 of which 50 per cent was certified.

Phillips Chemical Co., Texas Gulf Coast; applied for $38,760,000 of which 50 per cent was certified.

Chemical Industries Exposition

THE 23rd Exposition of Chemical Industries will be held at Grand Central Palace, New York, November 26 to December 1. Over 400 companies will exhibit their products, representing nearly 250 different classifications of equipment, materials, supplies, and services.

Assyrian Palace Air Conditioned

THAT the ancient Assyrians knew the principles of air conditioning is one fact gleaned this year by archaeologists in their third season of excavations on the site of the huge palace of King Ashur-nasir-pal II, at Nimrud. In the walls of one room were air-ducts to allow air to circulate freely. In niches let into the walls stood water containers to ensure a supply of cool, fresh water.

Annual ASRE Convention Offers Full Program of Papers and Discussions

WITH the fascinating city of New Orleans as its locale and a technical program replete with interesting papers and controversial conferences, the annual meeting of the ASRE to be held at Hotel Roosevelt, December 2-5, promises to be the most outstanding one in the Society's 47 year history.

Expanding a procedure adopted a few years ago of having a concurrent conference and informal discussions on a specific subject, the Program Committee has decided on four such conferences, some of which will run concurrently with the regular technical sessions. These conferences are for the discussion of (a) low temperatures (b) domestic refrigerator engineering problems (c) industrial insulation applications, and (d) packaged air conditioners.

Subjects Discussed at Symposiums

Among the subjects to be discussed at the Low Temperature Symposium are: Freon and Oil Relationship in Low Temperature Refrigeration; A Description of the Laboratory of Cryogenic Engineering at Massachusetts Institute of Technology—Its facilities and Products; Design and Construction Problems of Air Separation Plants; Low Temperature Application in the Field of Lyophilization; Moisture Removal From a –85 F Methylene Chloride Refrigeration System.

The Domestic Refrigeration Engineering Conference, the forerunner of this more informal type of meeting, will not schedule any formal papers but will present a discussion of alternate materials, a subject of prime importance in the present emergency, when the production of basic materials is restricted. Qualified representatives from suppliers of basic materials as steel, copper, aluminum, and chemicals used as refrigerants will present their views on the outlook for both the present and the future of the use of these materials in the refrigeration industry. The meeting will then be thrown open for a full and frank discussion of this subject.

Following the same pattern will be the Conference on Industrial Insulation Applications where a panel of four or five engineers, well qualified in the application of insulation, will present brief "off the cuff" statements on specific applications, following which a discussion will be had on the points raised by the speakers and other topics pertinent to the question under discussion. Among those invited to sit on the panel are engineers from U. S. Air Force, cold storage warehouses, a bakery, an ice plant, and other industrial installations.

Packaged Air Conditioning—"A Look to the Future" is the subject of the fourth conference. The topics to be discussed will be treated under the following headings: (a) Room Air Conditioners; (b) Self-Contained Air Conditioners; (c) Residential Air Conditioning. Each of these subjects will be discussed by a design engineer and a commercial application engineer giving their views on the future developments of these subjects. Following these presentations there will be a discussion of "Energy Sources for Packaged Air Conditioning" by a prominent utility engineer. The usual period for discussion will afford an opportunity for any questions from those who may be interested.

Technical Sessions

In addition to the conferences, the regular technical sessions will offer a wide variety of subjects of interest to the refrigeration engineer. Among those that have been scheduled are: Refrigeration and Developments in Farm Milk Operations, a discussion of bulk milk cooling and handling; Specific Heats of Foods; Fish Freezing, by a Norwegian engineer; Atomic Radiation of Food; Refrigerator Cars and Their Use; Citrus Fruits Storage; Measuring Ultra Rapid Temperature Changes; Testing Safety Valves to Comply with the ASA B-9 Safety Code; Electric Analogy of Heat Transfer; Some Unusual Air Conditioning Installations; and of particular interest to manufacturers and designers of air conditioning equipment, the Calibrated Room Calorimeter Test Method —Experience and Results. This device is specified by ASRE Standard 16-R for testing and rating room air conditioners and is the first information to be published on the subject.

The foregoing list of papers is somewhat tentative in that last minute changes may be made in the event that more interesting papers may be substituted, if in the opinion of the Program Committee, such action seems advisable.

As may be anticipated, the charming and romantic city of New Orleans may be expected to exemplify the old fashiond hospitality for which it is famed. This will be reflected in sightseeing trips to the French Quarter, or Vieux Carre, famous for its shops, antique stores, well known restaurants and picturesque old dwellings. Other attractions are visits to the French Market for cafe au lait, tours through the floral trail, boat trips in the harbor and auto trips through the bayou country. A masque ball is also on the tentative list of events. Inspection trips to some modern refrigeration installations are being planned.

Los Angeles Section, A.S.R.E.

AN INTERESTING deviation from its regular monthly meeting routine was engaged in by Los Angeles Section, American Society of Refrigeration Engineers, on October 15 when the members spent the afternoon and evening as guests of the United States Navy at Port Hueneme, Calif. The meeting itself consisted of one of the most interesting off-the-beaten-path programs the section has experienced in quite a while.

Members traveled by chartered bus from Los Angeles to the meeting site, the U. S. Civil Engineering Research and Evaluation Laboratory at the Construction Battalion Center, Port Hueneme, about 65 miles up the coast from Los Angeles. They met at the Adohr Milk Farms headquarters in Los Angeles, where parking facilities had been provided.

Afternon and evening technical sessions were held, which were interrupted by dinner in the Officers' Club at 6:45 p.m. Three technical papers presented at the afternoon session began with one at 4:40 p.m. by W. A. Bowen on "Cathode Protection Against Salt Water Corrosion." This was followed by a paper on "Vapor Compression Distillation" by H. J. Sieland, and a talk on "Simulated Biological Attack on a Temporary Protective Shelter," by Dr. C. R. Freberg.

The afternoon session, which was presided over by P. H. Askew, was adjourned at 5:50. p.m. Following the dinner, the technical discussions were resumed at 8 o'clock with a paper by Dr. F. E. Lowance on "Research for Military Shore Establishments." The fifth and final paper was entitled "Environmental Protection in Subterranean Shelters," by Warren Viessman.

The meeting adjourned at 9:00 p.m. after a period of discussion of the papers.

CONVENTION CALENDAR

NATIONAL ASS'N. PRACTICAL REFRIGERATING ENGINEERS
November 6-9, 1951
Peabody Hotel, Memphis, Tenn.
EMERSON BRANDT, Secretary

NATIONAL ASSOCIATION OF ICE INDUSTRIES
November 13-16, 1951
Shamrock Hotel, Houston, Tex.
GUY W. JACOBS, Exec.-Secy.

CANADIAN ASSOCIATION OF ICE INDUSTRIES
November 22-24, 1951
Royal York Hotel, Toronto, Can.
MILDRED CROFT, Secretary

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS
December 2-5, 1951
Hotel Roosevelt, New Orleans, La.
M. T. TURPIN, Secretary

SOUTH CAROLINA ICE MANUFACTURERS ASSN.
December 3-4, 1951
Columbia Hotel, Columbia, S. C.
GEORGE L. ENGLISH, Secretary

DELTA STATES ICE ASSOCIATION
December 3-5, 1951
Buena Vista Hotel, Biloxi, Miss.
R. N. MILLING, Secretary

MISSOURI VALLEY ICE MANUFACTURERS ASSOCIATION
January 7-9, 1952
Hotel President, Kansas City, Mo.
V. A. ESPHORST, Secy.-Treas.

OKLAHOMA ASSOCIATION OF ICE INDUSTRIES
January 20-22, 1952
Burlingame Hotel, Bartlesville, Okla.
HARRY T. HUDSON, Exec. Secy.

MICHIGAN ICE INDUSTRIES ASSOCIATION
February 12-13, 1952
Hotel, Detroit, Mich.
EDWARD W. JACKSON, Secy.

OHIO ASSOCIATION OF ICE INDUSTRIES
February 25-26, 1952
Deshler Wallick, Columbus, Ohio
ELIZABETH SHANNON, Secretary

NORTH CAROLINA ICE ASSOCIATION
March 10-11, 1952
Hotel Sir Walter, Raleigh, N. C.
LEWIS H. POWELL, Secy.-Treas.

SOUTHWESTERN ICE MANUFACTURERS' ASSN.
March 12-14, 1952
Hotel Texas, Fort Worth, Texas
P. A. WEATHERRED, Secy-Counsel

NORTHWEST ASSOCIATION OF ICE INDUSTRIES
March 26-28, 1952
Yakima Hotel, Yakima, Wash.
L. F. MARSH, Secretary

ILLINOIS ASSOCIATION OF ICE INDUSTRIES
March 20-21, 1952
Leland Hotel, Springfield, Ill.
WM. D. WRIGHT, Secretary

INDIANA ASSOCIATION OF ICE INDUSTRIES
March 31-April 3, 1952
ROBT. W. WALTON, Secretary
French Lick Springs Hotel

NATIONAL ASSOCIATION OF REFRIGERATED WAREHOUSES
May 5-8, 1952
Roosevelt Hotel, New Orleans, La.
WM. DALTON, Executive Vice-Pres.

ASSOCIATION DIRECTORY

AMERICAN INSTITUTE OF REFRIGERATION
H. T. McDermott, Gen. Secretary, 433 N. Waller, Chicago 44, Ill.

NATIONAL ASSOCIATION OF ICE INDUSTRIES
Guy W. Jacobs, Secy., 1706 L St., N. W., Washington 6, D. C.

NATIONAL ASSOCIATION OF REFRIGERATED WAREHOUSES
Wm. Dalton, Exec. Vice-Pres. Tower Bldg., Washington 5, D. C.

NATIONAL ASSOCIATION OF PRACTICAL REFRIGERATING ENGINEERS
Emerson A. Brandt, Secretary 435 N. Waller Ave., Chicago 44, Ill.

CALIFORNIA ASSOCIATION OF ICE INDUSTRIES
Jack L. Dawson, Secretary
461 Market St., San Francisco, Calif.

CANADIAN ASSOCIATION OF ICE INDUSTRIES
Mrs. Mildred E. Croft, Secretary
317 Eglinton Ave., Toronto, Canada

DELTA STATES ICE ASSOCIATION
R. N. Milling, Secretary
Ouachita Bank Bldg., Monroe, La.

EASTERN STATES ICE ASSOCIATION
Samuel Freer, Secy-Treas.
1044 Drexel Ave., Drexel Hill, Pa.

FLORIDA ICE ASSOCIATION
Muriel Washburn, Secretary
1926 Silver St., Jacksonville, Fla.

GREAT LAKES CHAPTER, N.A.R.W.
Harry Foster, chairman
Cincinnati Terminal Warehouses, Inc.
Cincinnati, Ohio

ILLINOIS ASSOCIATION OF ICE INDUSTRIES
W. D. Wright, Secretary
Clinton Pure Ice Co., Clinton, Ill.

INDIANA ASSOCIATION OF ICE INDUSTRIES
Robert W. Walton, Secretary
Board of Trade Bldg., Indianapolis, Ind.

KANSAS ASSOCIATION OF ICE INDUSTRIES
Fred E. Kunkle, Secretary
City Ice Delivery Co.
335 So. Washington St., Wichita, Kans.

KENTUCKY ICE MANUFACTURERS ASSOCIATION
R. T. King, Secretary
429 S. Seventh St., Louisville, Ky.

MICHIGAN ICE INDUSTRIES ASSOCIATION
Edward W. Jackson, Secretary
131 E. Kalamazoo Ave., Kalamazoo, Mich.

MISSOURI VALLEY CHAPTER, N.A.R.W.
H. A. Steinmeyer, chairman
Booth Cold Storage Co., St. Louis, Mo.

MISSOURI VALLEY ICE MANUFACTURERS' ASSN.
V. A. Esphorst, Secretary
3820 Washington St., St. Louis, Mo.

MOUNTAIN STATES ASS'N OF ICE INDUSTRIES
J. R. Espy, Secretary
Espy Ice Co., 2101-31st St., Denver 5, Colo.

NEBRASKA ASSOCIATION OF ICE INDUSTRIES
Frank Vogelsang, Secretary
W. T. Good Ice Co., Lincoln, Nebr.

NEW ENGLAND ICE ASSOCIATION
Raymond Wilber, Secretary
83 Winter St., Providence, R. I.

NEW JERSEY STATE ASSN., N.A.R.W.
Leo J. Fisher, president
Harborside Warehouse Co. Inc.
Jersey City, N. J.

NEW YORK STATE ASS'N REF. WAREHOUSES
Garth A. Shoemaker, president
Hygeia Refrigerating Co., Elmira, N. Y.

NORTH ATLANTIC CHAPTER, N.A.R.W.
Jerry Johnson, Chairman
Terminal Refrigerating & Warehousing Corp.
Washington, D. C.

NORTH CAROLINA ICE ASSOCIATION
Lewis H. Powell, Secretary
Capital Ice & Coal Co., Raleigh, N. C.

NORTH PACIFIC CHAPTER, N.A.R.W.
E. F. Swanberg, chairman
Diamond Ice & Storage Co.,
Seattle, Wash.

NORTHWEST ASSOCIATION OF ICE INDUSTRIES
L. F. Marsh, Secretary
1539 N. E. 37th Ave., Portland, Ore.

OHIO ASSOCIATION OF ICE INDUSTRIES
Elizabeth Shannon, Acting Secy.-Treas.
The Steubenville Ice Co., Steubenville, O.

OKLAHOMA ASSOCIATION OF ICE INDUSTRIES
Harry T. Hudson, Executive Secretary
708-9 Perrine Building, Oklahoma City, Okla.

PACIFIC STATES COLD STORAGE WAREHOUSEMEN'S ASSOCIATION
Jack L. Dawson, Secretary
461 Market St., San Francisco, Calif.

SOUTH CAROLINA ICE MANUFACTURERS ASS'N
Geo. L. English, Secretary
P. O. Box 603, Columbia, S. C.

SOUTH PACIFIC CHAPTER, N.A.R.W.
M. W. Young, Chairman
National Ice & Cold Storage Co.,
San Francisco, Calif.

SOUTHERN ICE EXCHANGE
Richard W. Florrid, Secretary
11½ Forsyth St. N. W., Atlanta, Ga.

SOUTHEASTERN CHAPTER, N.A.R.W.
W. B. Haggerty, Chairman
Tampa Cold Storage & Warehouse Corp.
Tampa, Fla.

SOUTHWESTERN CHAPTER, N.A.R.W.
C. P. Metcalf, chairman
Southwestern Ice & Cold Storage Co.,
Austin, Tex.

SOUTHWESTERN ICE MANUFACTURERS ASS'N
P. A. Weatherred, Secy. Counsel,
Mercantile Bank Bldg., Dallas, Tex.

TENNESSEE ICE MANUFACTURERS ASSOCIATION
W. E. Harlan, Secretary
Mt. Pleasant Ice Co., Mt. Pleasant, Tenn.

TRI-STATE ASSOCIATION OF ICE INDUSTRIES
L. R. Girton, Secretary
260 Boyce-Greeley Bldg., Sioux Falls, S. D.

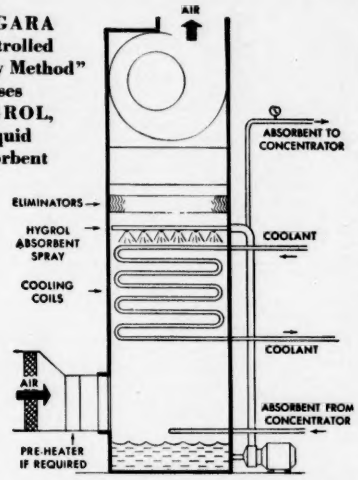
VIRGINIA ICE MANUFACTURERS ASSOCIATION
H. H. Snyder, Secretary
Alexandria, Va.

WEST VIRGINIA ASSOCIATION OF ICE INDUSTRIES
E. Dana Smith, Secretary
Diamond Ice & Coal Co., Charleston, W. Va.

WISCONSIN ASSOCIATION OF ICE INDUSTRIES
Paul F. Hoff, Secretary
1300 East Locust St., Milwaukee, Wis.

New Method Gives Precise Control in Air Conditioning

NIAGARA "Controlled Humidity Method" Uses HYGROL, Liquid Absorbent



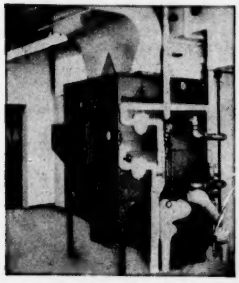
NIAGARA CONTROLLED HUMIDITY METHOD — FLOW DIAGRAM

● The "Niagara Controlled Humidity Method" gives complete control of temperature and relative humidity, holding constant conditions or varying them at the will of the user. Especially, it provides dry air at normal atmospheric temperatures with little or no refrigeration required.

The air is filtered and then enters a chamber where it is dehumidified in passing thru a spray of "Hygrol" Liquid (a hygienic hygroscopic chemical that absorbs the air-borne moisture and contains no salts or solids to precipitate). In the same chamber are located cooling coils which remove the latent heat of evaporation and also sensible heat as required.

The absorbent liquid spray falls into a tank at the base, where it is piped to a concentrator, removing moisture taken from the air. The re-concentrated liquid returns to the system. This process is continuous, and the apparatus operates at full capacity at all times.

This equipment is manufactured in a range of sizes providing from 1000 to 20,000 CFM of conditioned air from a single unit.



Installations have been made in food and chemical process industries, in packaging hygroscopic products, for preventing condensation of moisture on metals and other products in storage, in air conditioning for laboratory control and for human comfort.

●

For further information, write Niagara Blower Co., Dept. IR, 405 Lexington Ave., New York 17, N. Y.

For performance you can depend on!

ACME Refrigeration components have served the Refrigeration Industry continuously since 1919. This means that *ACME* Engineers have had an opportunity to solve almost every known heat transfer problem, under practically every possible condition. It means that *ACME* Equipment has been used, tested and improved in thousands of successful installations. Scientific design and long practical experience are combined in all *ACME* Products to give you efficient performance. *ACME'S* fine workmanship and painstaking inspection is your guarantee of low cost operation and long life.

ammonia condensers

1. Exclusive lock-nut construction available for quick and easy tube replacement.
2. A.S.M.E. construction and certification.
3. "Tailor Made" to specifications.
4. Dependable, versatile, economical.
5. Full range of models, types and sizes.

blow cold* industrial unit coolers

1. Hot-dip galvanized finish, assures greater dependability.
2. Your choice of vertical or horizontal discharge.
3. Easy access to coils.
4. Separable fan section.
5. Large inspection doors.
6. Air duct front or back, for greater convenience.
7. Available for Freon 12 or Ammonia.

* Trade Mark

evaporative condensers

1. For Freon or Ammonia.
2. Using standard A.S.R.E. ratings, capacities from 10 to 120 tons.
3. Your choice of three different fan locations.
4. Greater durability . . . it's hot-dip galvanized.
5. Available with internally mounted receivers, including piping.
6. Micromet basket for water treatment, included.

The *ACME* Line is complete. No matter how unusual your heat transfer problem may be, you will find an adequate STANDARD model and size of equipment to suit your requirements. *ACME* Engineers are at your service. Write mentioning your needs and complete information will be mailed, without obligation.

ACME INDUSTRIES, INC.
Dept. IR, Jackson, Michigan
CONTINUOUSLY SERVING THE REFRIGERATION AND AIR CONDITIONING INDUSTRY SINCE 1919

New Plants and Improvements

California

Exeter, Calif.—The firm of R. C. Walter & Sons recently completed a 140 car cold storage plant here for the purpose of storing Emperor table grapes. The plant incorporates a submerged coil-type brine system involving the use of ducts to transmit cold air to and from the storage rooms. All produce is palletized and with the plant's 68-ton refrigerating effect, allows a daily intake capacity of seven carloads of grapes.

Reedley, Calif.—E. M. Otani who states that frozen foods business is the fastest growing line in the selling of groceries is building a new cold storage warehouse to house frozen foods and will provide warehouse space for fresh vegetables and meats too.

Kansas

Wichita, Kans.—City Ice Delivery Co. has installed four additional S & S ice vending stations.

Missouri

St. Joseph, Mo.—A new automatic self-service ice dispensing station has been opened on 6th street between Albemarle and Isabelle Sts. by the Crystal Ice Co. Announcement of the opening of the station was made by Robert J. Jornayvaz, secretary.

Oklahoma

Shawnee, Okla.—Winlock Ice & Gin Co. has established a new S & S vending unit.

Tennessee

Bells, Tenn.—The Winter Garden Freezer Co., the biggest plant in the south packing foods for the retail market has received a $310,000 government loan under the Defense Production Act. J. O. Tankersley, president, made the announeement and said that a new 200,000 cu. ft. refrigerated room will be completed soon.

Washington

Seattle, Wash.—With a financial outlay of approximately a half million dollars, a new three story, 100 x 147 feet, fully refrigerated warehouse for foodstuffs is to be constructed here at the Spokane Street Terminal. Bids are being prepared and will be issued under the direction of S. C. Dearstyne, port engineer.

Sunnyside, Wash.—Plans and specifications are being completed for construetion of a modern turkey and poultry processing plant to serve the Washington Cooperative Farmers Association members in the Yakima Valley district, according to Harry J. Beermink, association general manager in Seattle. The cost will be approximately $200,000.

Texas

San Antonio, Tex.—For the first time in the history of San Antonio the city has a large scale processing and freezing plant for the handling and boxing of Gulf Coast shrimp, George Bernhardt, manager of the Foreign Trade Zone, has announced. Bernhardt said the plant facilities are capable of handling 250,000 pounds of shrimp per week.

Sales and Reorganizations

Los Angeles, Calif.—The Diamond Ice Co., operators of a 35 ton-a-day ice manufacturing plant at 3506 S. Central Ave. has been acquired from the Teeds family by Royden Ice Company of this city for an undisclosed purchase price. Captain Herbert M. Royden, new owner, announced that extensive modernization and improvements are contemplated as well as substantial enlargement of the plant's production facilities.

Champaign, Ill.—Twin City Ice and Cold Storage Co., 504 N. Market Street, quit business November 1 and has sold its buildings to Giles Sullivan of the Sullivan Chevrolet Co. Announcement of the suspension of activities by the 57-year-old Champaign enterprise was made known recently by D. C. Dodds, president and H. Caroll Schmalhausen, secretary. Ice making machinery in the plant has been sold to the Wichita Ice and Cold Storage Co.

Tuscola, Ill.—Everette C. Wood, Arcola real estate agent, recently announced the sale of the Tuscola Ice & Fuel property here to the Citizens Ice and Coal Company of Mattoon.

Danville, Ind.—Stuart Motors, Inc. has leased the lot now being occupied by the Polar Ice Co., South Jefferson St. for a period of three years with the privilege of another two years. A representative of the Polar Ice Company stated that their lease was up the first of November but no definite site has been selected on which to move the ice house.

McCook, Neb.—Sale of the McCook Ice and Packing Company plant here was announced by the former owner, Max Williams. The new operators are Clyde White, former manager of the McCook Packing company, president and manager; R. A. Drum of the Metz Brewing Co. of Omaha, vice president; and J. C. Allgaier, Sr. of the Omaha Athletic Club, secretary treasurer.

Syracuse, N. Y.—People's Ice recently took over the ice manufacturing and distribution business discontinued under the name of Arctic Ice by the Central City Cold Storage Company. This business will be serviced from the modernized and expanded People's plant at 1054 Oswego Blvd. Central City Cold Storage will use the Arctic Ice space at 1001 Burnet Ave. for expansion of its cold storage facilities.

Cleveland, Okla.—The local ice dock opened under new management recently when Bert Casey purchased it from Boc Brock.

Red Bank, N. J.—Eugene A. Bush, Jr., has purchased the interest of his father, E. Alan Bush, in the Red Bank Cold Storage and Locker Co. Inc., at 15 Herbert Street, and is now sole proprietor. Mr. Bush studied animal husbandry at the University of Arizona.

East Palestine, Ohio—The Polar Ice plant, built by the late Archibald Jones, and since his death in the hands of his estate, has been purchased by Peter Casper, local realtor. Casper plans to rejuvenate the plant and put it back into active operation.

Pawnee, Okla.—The Southwestern Ice company ice dock has been moved to Kearney Hill's place of business in East Pawnee on U. S. 64 and is being operated by Hill.

Fires and Accidents

Macon, Ga.—A boiler room fire at Kennett-Odom Ice & Coal Company damaged machinery and blazed up through the plant roof. It was believed by L. J. Moon, clerk, to have been started by some hot grease. The machinery damage may be considerable.

Okolona, Miss.—The Okolona Ice Plant, owned and operated by J. L. Blackwell, was destroyed by fire of unknown origin. The 25-ton ice plant was partially covered by insurance. The company made arrangements to get ice at Amory and regular deliveries are being made.

Puyallup, Wash.—The Puyallup Ice Company plant here was damaged to the extent of $5,000 in an explosion which rocked an area six blocks square. The explosion was apparently caused by excessive steam in a receiver tank at the plant, according to C. J. Brakefield, fire chief.

Nyssa, Ore.—Firemen were called to the remains of the Polar Cold Storage plant on Arcadia boulevard recently to extinguish a fire in a storage building that was saved by firemen at the time of the disastrous fire at the plant in January. Workmen had been using a cutting torch in the remains of the main section of the plant during the day but it was not known whether that was the cause of the fire which also set fire to the redwood fibre insulation.

New Incorporations

Kings, N. Y.—Articles of incorporation were filed with the office of the Secretary of State, Albany, September 27, for the National Cold Storage Co. Inc., business of cold storage. Capital stock was listed at 3500 shares. Directors: John F. Byrne, Jr., Roy A. Prediger and William J. LaVigne, Jr., whose addresses are 90 Broad St., New York City.

Charlotte, N. C.—Avant Fuel & Ice Company, Inc., has obtained a charter to deal in fuel, ice and coal. Authorized capital stock of $100,000, with $300 stock subscribed by W. A. Avant, J. H. McGill and Dorothy Milliken, all of Charlotte.

Seattle, Wash.—The Crystal University Ice Co. was recently incorporated with capitalization of $50,000 by the following incorporators: John E. Furman, Walter J. Ackerman, E. B. Derricott, all of Seattle.

Spokane, Wash.—Capitalized for $50,000 the Northwest Refrigeration Co. of Spokane, has recently been incorporated by Robert A. Bothwell, Norma A. Bothwell, Roy H. Blangers, and Gladys B. Blanger, all of Spoane.

American Ice Report

THE American Ice Co. net income for the third quarter was estimated at around 50 percent greater than amount reported for the quarter last year. On this basis, the nine months net income would approximate $290,000 after federal taxes. Deducting dividend requirements would leave a balance equal to 40 cents a share on the common.

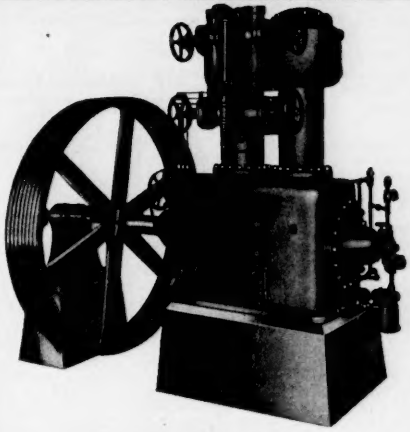
Welded Cans
Integral Tube Cans
Arctic Pownall Cans
Can Baskets
Condenser Trough

• • • • • • • • • •

Industrial Trucks and Trailers

THE OHIO GALVANIZING & MFG. CO.
NILES OHIO

Sterling



Serving the Refrigeration Industry
with
DEPENDABLE REFRIGERATION
for more than
50 YEARS

Sincere effort, engineering progress and constantly increasing production facilities through the years has made the slogan "STERLING DEPENDABLE REFRIGERATION" more than a slogan . . . it is a FACT!

Check over your requirements NOW . . . and look into the Sterling line. Write us for prices and complete information on Sterling ammonia compressors, condensors, receivers, ice tanks, surge drums and related products.

See your nearest Sterling distributor.

Most Models Are Available For Immediate Delivery

REYNOLDS MANUFACTURING CO.
SPRINGFIELD · · · MISSOURI.

DEATHS

WM. BIDDLE, prominent retired Pittsfield business man, owner of Biddle & Sons ice plant, Pittsfield, Ill., died October 5. He was 77 years old. Mr. Biddle opened the Biddle ice plant in 1925 and as the business prospered, he added a milk and pasteurizing plant. He retired in 1940 and the business has been conducted by his three sons, John, Arthur and Robert.

JOHN EDWARD PATTERSON, ice plant owner of Benoit, Miss., was killed when the pickup truck he was driving collided with another truck. Mr. Patterson was a lifelong resident of Benoit. He was 50 years old.

WM. M. LAUGHEAD, a refrigeration engineer of Des Moines, Iowa, before his retirement died September 30 of a heart ailment. He was 74 years old. He is survived by four daughters and four sons.

CLAUS H. KRUSE, formerly a wholesale and retail ice dealer, Mount Ross, N. Y., died at his home September 10. He was 73 years old. Survivors include two sons and two daughters.

JOHN H. STACKLER, 74, for 33 years owner of an ice business in Buffalo, N. Y., died September 1 at his home at age of 74 years. He retired in 1943. Mr. Stackler was born in Germany and came to Buffalo in 1943. His widow, four daughters and two sons survive.

HENRY C. GERDES, a life-long resident of Bethalto, Ill., and who had been in the coal and ice business until 1942, died September 21. He was 48 years of age. He had been mayor of Bethalto for the past twelve years but had retired from the coal and ice business because of failing health. He is survived by his widow and a daughter, Nancy.

ROBERT JAMES HINES, manager of the Tiptonville (Tenn.) Ice & Coal Co., died August 18. He was 32 years old and had managed the ice plant seven years. He leaves his widow, Mrs. Jane Hines, and two children. Janet Ann and Rodney.

LEONARD G. BLEIDT, Park Hill, Ark., retired ice manufacturer, died of a heart attack September 15 while enroute to a Little Rock hospital. He was 78 years of age, a member of the Baptist church and a Mason. Survivors include his widow, Mrs. Fannye Bleidt, two daughters and a son.

BEVERLY B. HASLETT, director and vice-president, Haslett Warehouse Company, San Francisco, died recently. He was 48 years of age. Besides being in charge of field warehousing division for the Haslett Warehouse Company, he was also a director and vice-president of Warehouse Investment Company and a director and vice-president of Warehouse Investment Company and a director and president of Fidelity Warehouse Corporation. He is survived by his mother, Mrs. P. E. Haslett, and his son, B. B. Haslett Jr., of San Francisco.

CYRUS W. MILLER, executive secretary of the Refrigeration Industry Safety Advisory Committee, died from a heart attack August 14 at his home in North Tarrytown, N. Y., at the age of 55. Mr. Miller was an authority on safety in the installation and operation of mechanical refrigeration systems and was largely responsible for the acceptance in many cities and states of uniform safety codes for mechanical refrigeration. He was a member of New York section of A.S.R.E.

RUDOLPH BOZEC Sr., Willow Springs, Ill., owner of the Bozec Coal & Ice Company died August 27, aged 58 years. Mr. Bozec was killed in the yard of his company. He is survived by his widow, Mrs. Pauline Bozec, three sons and four daughters.

QUALITY COILS FOR *ALL* APPLICATIONS

WELDED HEADERS, PIPE BENDS AND AMMONIA RECEIVERS

Whether your next job be for a single bend, or coil or complete Piping system, Chicago Nipple can supply your requirements. Experienced workmen, practical engineers, and modern equipment reflect the quality of our products.

Coils are of selected ammonia pipe—all joints are electrically welded—checked under water with an air pressure of 300 pounds to guarantee tightness.

SEND DRAWING OR BLUE PRINT FOR QUOTATION

CHICAGO NIPPLE MFG. CO.

1997 Clybourn Ave., Chicago 14, Ill.

Steam Baked

Reliable TRADE MARK Corkboard

- 30 years serving Cold Storage, Meat Packing Industries, and Ice Plants.
- Prompt shipments anywhere.
- Packed in strong fiber cartons for protection in shipments and storage.

LUSE-STEVENSON CO., INC.

879 Blackhawk Street
CHICAGO 22, ILLINOIS

FAST, ECONOMICAL CRUSHER SAVES TIME, LABOR COST!

The new and fast-operating "Little Chief" Ice Crusher by Bateman has three grate adjustments and will grind a 25-pound block of ice into fine ice in 12 seconds; into medium ice in 8 seconds, and into coarse ice in only six seconds.

It holds snow to an absolute minimum, is galvanized and has a chute for filling bags. It is simple—and dependable. There are no gears since drive is direct from two-groove flywheel.

Because of high grinding speed, the "Little Chief" operates from a ¾ H.P. motor. If desired, motor will be provided at prevailing price.

ONLY

$149.00

Less Motor
FOB Mineral Wells

WRITE TODAY FOR FULL INFORMATION

Bateman

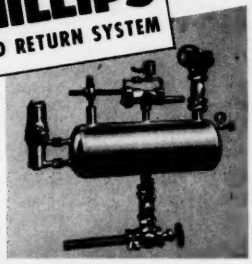
Ice Processing Equipment

MINERAL WELLS, TEXAS

for Complete

COMPRESSOR PROTECTION

install a **PHILLIPS** LIQUID RETURN SYSTEM



- **SAFEGUARDS** Ammonia Compressors
- **ASSURES** Economical Operation with Full-flooded Coils

Here's the proved method of protecting ammonia compressors from the damages of liquid slop-over. Phillips Liquid Return Systems effectively return refrigerant liquid from a suction line trap to the liquid receiver or liquid line—and, effect savings in operation. With a Phillips System, full flooding of coils is possible for maximum efficiency of evaporation and properly-conditioned suction gases are assured.

PHILLIPS FLOAT CONTROLS
For "Freon"—
1 to 1000 Ton Cap
For Ammonia—
1 to 2000 Ton Cap

Several types of systems are available: for Gravity, Injection Lift and Pressure Lift operation, in sizes up to 1000 tons. A Phillips Engineer will gladly help to select the right one to assure complete protection for you. Write today for full information in Bulletin LRS-50.

H. A. PHILLIPS & CO. DESIGNERS AND ENGINEERS REFRIGERATION CONTROL SYSTEMS
3255 W. CARROLL AVENUE • CHICAGO 24, ILLINOIS

Just remember the name ARMOUR for

Ammonia **when you want it**

where you want it—and *Fast...*

Wherever you are there's an Armour office nearby to take your order for Anhydrous Ammonia. Just phone Armour and you'll get prompt, courteous service. Armour's Anhydrous Ammonia is guaranteed pure—free of moisture and non-condensable gases. And to insure trouble-free operations, every cylinder is tested and checked before shipping.
Available in 50-, 100- or 150-pound cylinders.

You can depend on Armour's Ammonia and Service

ARMOUR *Ammonia Division*

Armour and Company, 1355 W. 31st St., Chicago 9, Ill.

What's New

MACHINERY
APPLIANCES • PROCESSES

Step Controller for Refrigeration Compressors

A PNEUMATIC "Step Controller" has been developed by the Johnson Service Company, Milwaukee, Wisconsin, manufacturers of automatic temperature and air conditioning control systems. Although this controller may be applied to many sequence control problems, it is designed especially for controlling multiple stages of refrigeration capacity. Capacity control is accomplished by starting and stopping compressors in sequence, loading and unloading cylinders, or a combination of both.

The unit is available in 4, 6, 8 or 12-switch models. Each of the single-pole, double-throw switches is operated by a pair of cams on a shaft which is rotated by a pneumatic piston in response to a pneumatic temperature or pressure measuring instrument. The "on" and "off" points of each switch are individually adjustable over the entire range of operation. Several different springs are available for the piston, to provide a selection of ranges, or the piston may be provided with a pilot positioner which permits adjustment of the operating range.

The controller is provided with a current failure solenoid which exhausts air from the piston, returning all switches to their normal position whenever current is interrupted. An adjustable time delay, providing up to 12 minutes for a complete piston stroke, assures sequence starting, regardless of the demands of the controller, when power is restored. The unit is mounted on a sub-panel which is inserted into a metal cabinet. All internal electric wiring and air connections are provided as part of the assembly.

The "step Controller" is ordinarily operated by a thermostat located in the chilled water line, or by a pressure controller acuated by the suction pressure. Its introduction makes available a unique, single-unit device capable of performing all of the functions necessary in controlling multiple step refrigeration installations.

Masonry Drill

A NEW carbide tipped masonry drill designed and marketed by the Super Tool Company, Detroit 13, Michigan is known as the "Speed Spiral." This drill is machined from

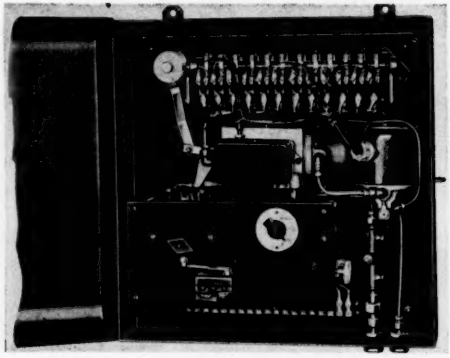
the solid with a round nose supporting the carbide tip. The design provides ample dust clearance without necessitating gashing ahead of the carbide tip or otherwise weakening the end that does the work. It also reduces the chance of cracked or weakened tips due to brazing strains.

Double lead fast spiral dust grooves are made extra deep for long life. Holes up to 12 in. deep can be drilled without stopping or removing the tool from the hole. The drill body is the same as the nominal size of the drill and the wide lands serve to guide it in producing a clean and perfect hole.

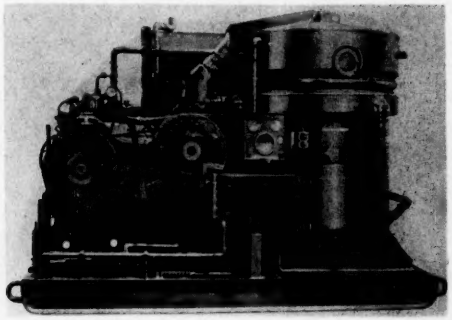
Thermocompression Evaporator

FOR some years Mechanical Equipment Company, Inc. of New Orleans has been developing and pioneering thermocompression evaporator units for all types of uses, in any capacities, with any type drive. Their development, due to vast experience during World War II and much experimentation thereafter, has resulted in the production of several stock models and many special adaptations for particular uses.

Some of their uses include: making pure distilled water from seawater for drinking and ice-making; distilled water for oil drilling where pure water is not available; concentrating of many types for many process industries; in short, distillation or concentration of any type in any quantity. These units according to the manufacturer are in use all over the world.



Johnson Pneumatic Step Controller

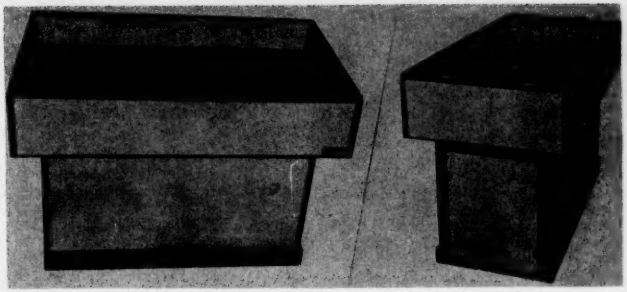


Thermocompression evaporator unit, skid mounted, Diesel powered, 335 gallons per hour distilled water.

New Display Table

THIS Model F. insulated end and aisle display is offered to the retail food trade by Institutional Sales, 4930-32 Portico St., Philadelphia 44, Pa., manufacturers of Foldaway display tables.

This display was designed for the sale of the many perishable items in the modern food market. The "F" can be used wet, dry, or with ice. It can increase the sale of such high profit, low volume items as oysters and crab meat, salads, cut melons, smoked meats, baked goods, sweet corn, etc.



Side and end view Model F insulated end and aisle display table.

A welded, watertight aluminum pan on a sturdy water-resistant frame, with white Marlite and metal mouldings, the "F" is insulated with Fiberglas and has pitch and cut-off valve for easy drainage. Its overall dimensions are 48 x 24 in. x ½ in. high.

New Ammonia Canister

A NEW ammonia canister for use with the MSA ammonia mask has been developed by the Mine Safety Appliances Company, Pittsburgh, Pa. The new canister reportedly increases the service life of the mask 100 per cent.

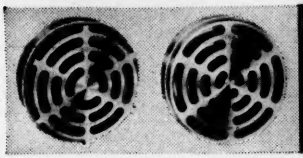
Bearing United States Bureau of Mines Approval Number 1449 under rigid Schedule Number 14 E, the canister is filled with a new sorbent instead of the silica gel formerly used. This ammonia mask, first canister-type ammonia mask officially approved by the Bureau of Mines, finds its widest application in ice and refrigeration plants, packing plants, cold storage warehouses, and chemical plants although it is used in many other industries. It is equipped with an all-vision face piece to assure greater visibility while allowing complete eye protection.

Further details are available from Mine Safety Appliances Co., Braddock, Thomas, and Meade Streets, Pittsburgh 8, Pa.

Soldering Flux

A NEW non-acid soldering flux paste in stick form is announced by the Lake Chemical Co., Chicago, Ill. This is in the form in which the company produces Pipetite-Stik and Krak-Stik. Known as the La-Co non-acid soldering flux paste, the new product is claimed to instantly dissolve oxides, and prepares a clean and free surface for firm union of solder and metal. It fluxes right through oily surfaces. It can be used on all types of metals, makes a perfect joint and will prove more economical because it eliminates unnecessary cleaning.

has no equal in the race for greater output



VOSS VALVES have no equal

for they assure maximum compressor efficiency

It is a matter of record that everytime an ordinary compressor valve is replaced with a specially designed VOSS valve, the immediate result is increased efficiency and greater output . . . and this record covers thousands of installations, as letters and reports testify.

VOSS VALVES and PLATES are made to specifications for all types of air, gas and ammonia compressors; from 1 to 16" in diameter and for pressures from 3 to 4,000 pounds and for speeds from 110 to 1750 rpm.

VOSS VALVES and PLATES are NOT STAMPED; they are milled and machined for perfect fit; of finest heat treated alloyed steels; they are ductile; resist fracture, high temperatures and corrosion; withstand fatigue; won't work-harden, chip, splinter, crack or score cylinder walls.

INCREASE EFFICIENCY AND OBTAIN GREATER OUTPUT . . . send us the name, bore, stroke and speed of your compressors. Our detailed proposal will be sent without obligation.

VOSS VALVES and PLATES ASSURE

- Quiet, vibration-free operation
- 20 to 60% more valve area
- Less power consumption
- Low pressure loss
- Normal discharge temperature
- Lower operating costs
- 35% more work

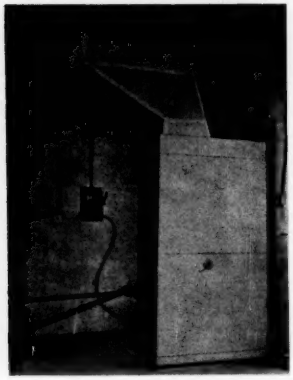
J.H.H. VOSS VALVES REG. U.S. PAT. OFF.

J. H. H. VOSS CO. INCORPORATED

783 EAST 144th STREET, NEW YORK 54, N. Y.

New Typhoon Heat Pump

A NEW packaged Typhoon Prop-R-Temp heat pump is announced by the Typhoon Air Conditioning Company. This heat pump, according to the announcement was developed and tested in Florida by the Typhoon Prop-R-Temp Corporation of Florida, and installations in that area have been observed over the past three years. The Florida company is headed by Edward L. Garfield, who as Typhoon's chief engineer for many years, was responsible for many of Typhoon's engineering contributions to the Air Conditioning industry.



New Prop-R-Temp Heat Pump Installed In Residence

Produced in sizes ranging from 2 to 20 tons capacity, it is similar in appearance to the standard Typhoon packaged unit. The same cabinet is used, although in many cases the plenum chamber is replaced by duct connections. In place of the four to six hand-operated valves which were used in most earlier heat pump jobs, it employs an electrically-operated changeover valve controlled by a selector switch which causes the unit to heat or cool at will.

The same compact design which characterizes the Typhoon packaged air conditioner is utilized in the heat pump, and it is claimed that arrangements of parts and piping in the Prop-R-Temp unit make for a simple, accessible machine in which the evaporator and the condenser perform their dual duties more efficiently than has been possible in earlier heat pump designs.

Most of the units installed to date have been placed in new homes, which constitute the most important market at present. However, there has been considerable demand for these heat pumps among various stores, restaurants and other business establishments, especially where both air conditioning and heating are needed in a new building, or where air conditioning is being added, and heating equipment is insufficient.

MANUFACTURERS' NEWS

Mineral Wool Institute Elects Christner President

G. J. CHRISTNER of The Eagle-Picher Sales Company, Cincinnati, was elected president and chairman of the board of the Industrial Mineral Wool Institute at its tenth annual meeting on September 25 at Hot Springs, Virginia. Christner, vice-president and general manager of Eagle-Picher's Insulation Division, served as vice-president and a director of the Institute during the last year.

The sixteen member companies of the Institute in the United States and Canada manufacture industrial insulation for electric power stations, petroleum and gas refineries, refrigeration and air conditioning installations, and chemical precessing plants.

At the Hot Springs meeting, H. V. Elkins of Owens-Corning Fiberglas Corporation, Toledo, was elected vice-president and Frank Christenson of Refractory & Insulation Corporation, New York, named treasurer of the Institute.

Easier and Cheaper with

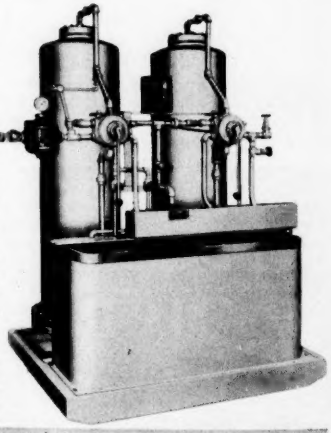
INDUSTRIAL Water Demineralizer

It's worth looking into . . .

The demineralization of water is not something new. It is used in the food industry, in the chemical and other industrial processing where chemically pure water is used in quantity. The very low cost warrants your looking into it.

Here are some of the advantages you get with an INDUSTRIAL demineralizer in ice making. Since the dissolved mineral salts in ordinary water are removed in passing through the ion-exchange resins, core-water removal and replacement is unnecessary. Losses due to cracking are greatly reduced. Freezing at the lower brine temperature increases daily yield. And the bulk of the cake of ice is clearer—your customers will notice that.

If you will send us an analysis of the water you are using, the quantity you need, and at what rate (gallons per hour) we will send you information on INDUSTRIAL demineralizers, estimate of costs, performance data, etc. Better do it now.



A typical two-bed INDUSTRIAL Water Demineralizer. Standard models available with capacities up to 1000 gph. Special units of any capacity engineered to requirements.

FILTERS Pressure Type · PUMPS Centrifugal · CORROSION TESTING APPARATUS Salt Fog • Humidity

INDUSTRIAL FILTER & PUMP MFG. CO.

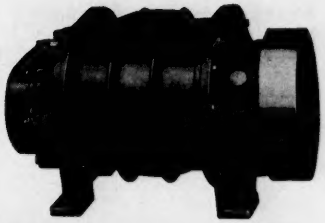
5914 Ogden Avenue
Chicago 50, Illinois

RUBBER DIVISION Vulcanized Linings • Molded Products · WATER DEMINERALIZERS

LOOKING FOR V·P·L ?

To be sure of air supply in constant Volume at required Pressures and low power cost, specify R-C Rotary Positive Blowers. Available in any required sizes, with varying capacities to fit your loads, R-C Blowers will give you many years of dependable, economical performance. Ask us about your needs or write for free Bulletin R-C 1247.

Roots-Connersville Blower Corporation
510 Columbia Avenue, Connersville, Indiana

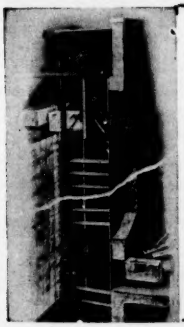


ROOTS-CONNERSVILLE BLOWER BUILDERS SINCE 1854
ONE OF THE DRESSER INDUSTRIES

THE INDEX LINE
ICE DEALERS SUPPLIES

Only the Highest Quality Merchandise and efficient service necessary for the proper and profitable operation of your business. Write for our 1951 catalog.

INDEX COUPON AND SUPPLY COMPANY
LA PORTE, INDIANA



CEMCO

Double Gig Ice Hoist
Fast - Sturdy -
Dependable -

Send for details

THE CAPITAL ELEVATOR & MFG. CO.
424 W. Town St.
Columbus 8, Ohio

New REMPE
HX-CHANGERS
solve many problems of heating and cooling liquids and vapors

Illustration shows HX-CHANGER with coil exposed.

Standard units for

- Water cooled refrigerant condensers.
- Converting air-cooled compressors to water-cooled service.
- Combination water-cooled condenser-receiver.
- Refrigerant to refrigerant heat exchangers on low temperature cascade and two-stage systems.
- Water chiller using refrigerant as cooling medium.
- Cooling lubricating and cutting oils using refrigerant.
- Heating oils and chemicals, water and other liquids with steam.

Write for bulletin.

REMPE CO. — REMPE COMPANY
348 N. Sacramento Blvd., Chicago 12, Ill.

DIMCO CAST ALUMINUM FIN EVAPORATING COIL

★ *Saves Space*
★ *Saves Weight*
★ *Saves Cost*

CAN BE USED WITH ANY REFRIGERANT
SALES AGENCIES SOLICITED

Manufactured by
DETROIT ICE MACHINE COMPANY
2615 Twelfth St., Detroit 16, Mich.

DIMCO Fin Coils solve low headroom problem
View of Mezzanine Lard Storage Room
Peters Sausage Company, Detroit, Mich.

Vending Machine Company Names Western Distributor

THE appointment of Western Ice Equipment Co., 420 Market St., San Francisco, Calif., as distributor for their complete line of ice and fuel vending equipment in the States of California, Oregon, Washington, Arizona and Nevada has been announced by the S & S Vending Machine Co. of San Jose, Calif. The S & S Vending Machine Co. of San Jose, Calif. has had more than 20 years' experience in manufacturing automatic ice vending stations and equipment. Western Ice Equipment Company is under the ownership and management of Tom Gilliam, who has been identified for many years with the ice industry and who has been serving western ice manufacturers and dealers with standard ice equipment.

Vivian New Distributor for S & S Vendors

THE Vivian Manufacturing Co., St. Louis, Mo., has been appointed a distributor for the S & S Vending Machine Co., manufacturers of ice vending equipment. The Vivian Company is a long established concern supplying the ice trade with ice tools and supplies and is well known throughout the ice industry.

"That's what I need—a compact unit to go with my ice builder."
"That 4 cylinder job will just fit our space and handle peak cooling and storage."
Two cyl. 5 x 5 Marine Type Self-Contained Unit.
"That's my next buy for sub-zero freezing work."
Six cyl. 6½ x 5 Type K
"Another 8 x 8 would take care of our second stage load."

Look ahead with CP Refrigeration

From the CP "Balanced Line" you'll get —not just a compressor—but *exactly* the unit *you* need, to do *your* refrigeration job . . . large or small . . . with efficiency and economy assured by CP's more than 60 years of refrigeration pioneering and leadership. You're *right* when you choose CP.

THE CREAMERY PACKAGE MFG. COMPANY

General and Export Offices: 1243 W. Washington Blvd., Chicago 7, Illinois

CATALOGS and BULLETINS

Whitlock Issues New Refrigeration Bulletin

A FOUR-PAGE bulletin on refrigeration equipment has been issued by The Whitlock Manufacturing Co., Hartford, Conn. It contains illustrated description of ammonia condensers and brine coolers with tables of dimensions for condensers and brine coolers, water chillers, freon condensers, receivers and cooling coils. Illustrated throughout, the bulletin provides interesting and valuable information on the subject covered.

Frick Bulletin

A NEW Frick bulletin deseribes and illustrates unit air conditioners and larger air conditioning installations, coolers for air, water, brine, etc. Condensers, control equipment valves, fittings, etc. are illustrated and described briefly.

Statement of Ownership and Management of ICE AND REFRIGERATION for October 1, 1951

The following is a statement of ownership, management, etc., as required by the act of Congress of August 24, 1912, as amended by the acts of March 3, 1933 and July 2, 1946 (Title 39, United States Code, Section 233) of ICE AND REFRIGERATION, published monthly at Chicago, Ill., for October 1, 1951:

1. The names and addresses of the publisher, editor, managing editor, and business manager are:

Publisher, Nickerson & Collins Co., Chicago, Illinois.

Editor, H. T. McDermott, Elmhurst, Illinois.

Managing Editor, E. R. Curry, Chicago, Illinois.

Business Manager, L. R. Townsley, Chicago, Illinois.

2. The owner is (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.)

Nickerson & Collins Co., 435 N. Waller Ave., Chicago 44, Illinois.

Stockholders: H. T. McDermott, Elmhurst, Illinois; H. T. Curtis, Chicago, Illinois; L. R. Townsley, Chicago, Illinois.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

H. T. MC DERMOTT, Editor

Sworn to and subscribed before me this 27th day of September, 1951.

Helen G. Smith

(SEAL)

(My commission expires June 24, 1952.)

THE BUYERS DIRECTORY

INDEX TO ADVERTISEMENTS OF THESE FIRMS—PAGE 80

ABSORBERS
Frick Co., Waynesboro, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

AIR AGITATING SYSTEMS AND FITTINGS
Ice Plant Equipment Co., Inc. Philadelphia, Pa.

AIR COMPRESSORS
Frick Co., Waynesboro, Pa.

AIR CONDITIONING EQUIPMENT
Frick Co., Waynesboro, Pa.
Niagara Blower Co., New York, N.Y.

AMMONIA COMPRESSOR VALVES
Frick Co., Waynesboro, Pa.

AMMONIA COMPRESSORS
Creamery Package Mfg. Co., Chicago, Ill.
Dersch, Gesswein & Neuert, Inc. Chicago, Ill.
Frick Co., Waynesboro, Pa.
Kehoe Machinery Co., Inc., R. P., Ridgefield Park, N. J.
Reynolds Mfg. Co., Springfield, Mo.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.

AMMONIA CONTROL DEVICES
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.

AMMONIA FLOAT VALVES
Armstrong Machine Works, Three Rivers, Mich.
Frick Co., Waynesboro, Pa.
Phillips & Co., H. A., Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.

AMMONIA MANUFACTURERS
Armour Ammonia Div., Armour & Co., Chicago, Ill.
Barrett Div., The, Allied Chemical & Dye Corp., New York, N. Y.
Bower Chemical Mfg. Co., Henry Philadelphia, Pa.
du Pont, Polychemicals Dept., Wilmington, Delaware

AMMONIA MASKS
Ice Plant Equipment Co., Inc., Philadelphia, Pa.

AMMONIA PURIFIERS
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Frick Co., Waynesboro, Pa.
Vilter Mfg. Co., Milwaukee, Wisc.
Vogt Machine Co., Henry, Louisville, Ky.

AMMONIA RECEIVERS
Acme Industries, Inc., Jackson, Mich.
Creamery Package Mfg. Co., Chicago, Ill.
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Frick Co., Waynesboro, Pa.
Kehoe Machinery Co., Inc., R. P., Ridgefield Park, N. J.
National Pipe Bending Co., New Haven, Conn.
Rempe Company, Chicago, Ill.
Reynolds Mfg. Co., Springfield, Mo.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.

AMMONIA VALVES & FITTINGS
Acme Industries, Inc., Jackson, Mich.
Dersch, Gesswein & Neuert, Inc. Chicago, Ill.
Shank Co., Cyrus, Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.

ARCHITECTS AND ENGINEERS
Greene, Van R. H., New York, N. Y.
Ophuls & Associates, Fred, New York, N. Y.

ASPHALT PRODUCTS
American Bitumuls & Asphalt Co. San Francisco, Calif.

AUTOMATIC CONTROL DEVICES
Alco Valve Co., St. Louis, Mo.
Armstrong Machine Works, Three Rivers, Mich.
Frick Co., Waynesboro, Pa.
Phillips & Co., H. A., Chicago, Ill.
Rex Engineering & Sales Co., Oklahoma City, Okla.
Vilter Mfg. Co., Milwaukee, Wis.

BAGS, ICE
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Index Coupon & Supply Co., La Porte, Ind.
International Paper Co., New York, N. Y.
Union Bag & Paper Corp., New York, N. Y.
United Ice & Oil Supply Co., Boston, Mass.

BAGS, WATERPROOF PAPER
Index Coupon & Supply Co., La Porte, Ind.
International Paper Co., New York, N. Y.
Union Bag & Paper Co., New York, N. Y.

BEER COOLERS
Frick Co., Waynesboro, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

BLOWERS
Frick Co., Waynesboro, Pa.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.

BOILERS
Frick Co., Waynesboro, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

BOILER TUBES
Byers Co., A. M., Pittsburgh, Pa.

BOOKS—TECHNICAL
Nickerson & Collins Co., Chicago, Ill.

BRINE CIRCULATORS
Creamery Package Mfg. Co., Chicago, Ill.
Frick Co., Waynesboro, Pa.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Reynolds Mfg. Co., Springfield, Mo.
Roots-Connersville Blower Corp., Connersville, Ky.

BRINE COOLERS
Acme Industries, Inc., Jackson, Mich.
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Frick Co., Waynesboro, Pa.
Kehoe Machinery Co., Inc., R. P., Ridgefield Park, N. J.
Reynolds Mfg. Co., Springfield, Mo.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.

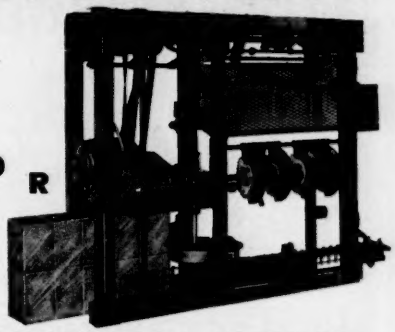
BRINE SPRAY COOLING
Acme Industries, Inc., Jackson, Mich.
Frick Co., Waynesboro, Pa.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.

CAN DUMPS
Frick Co., Waynesboro, Pa.
Gifford-Wood Co., Hudson, N. Y.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Kehoe Machinery Co., Inc., R. P., Ridgefield Park, N. J.

(Buyers Directory continued on next page)

RE-BUILDING SERVICE

F O R



PERFECTION and MILLER ICE SCORING MACHINES

● Your Perfection or Miller Scoring Machine, providing the frame is in good condition, can be completely reconditioned and returned to you at a minimum cost. This service returns your Scorer to its peak operating efficiency and carries a "New Machine" guarantee.

● If it's spare parts you need, we have a complete stock for Perfection and Miller models.

For detailed information, write, call or w/o:

NEW SCORING MACHINES

● For over 29 years, Perfection has built Ice Scoring Machines to the satisfaction of the Ice Trade . . . We have a variety of models to meet your every requirement as to type of machine and capacity.

Perfection Ice Scoring Machine Co. Ltd.
P.O. BOX 2140 FORT WORTH, TEX., PHONE ED-1258

SHANK
REFRIGERATION PRODUCTS

Always The Leader In Improved Valve Construction

3-WAY DUAL SHUT-OFF VALVE

For use where Refrigeration Codes require dual relief valve installations. Stainless steel stem. Indicator plate on hand wheel shows position of valve shut off. Completely rust- proofed.

RELIEF VALVES

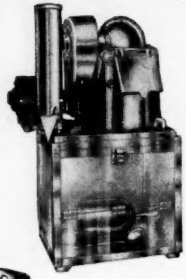
For Ammonia and Freon. One piece body design—rustproof finish. Internal construction—stainless steel—will not corrode. Positive relief action. Pressures from 75 to 400 lbs.

See your jobber—or write us for prices.

CYRUS SHANK CO.
629 W. Jackson Blvd. Chicago 6, Ill.

SNO-CONE ICE SHAVERS

Another Market for Ice



Sno-Cone shavers are easily rented or sold to carnivals, fairs, Home-comings, Bars, etc.

Write for Bulletin No. 106 for detailed information

VIVIAN Manufacturing Co.
4132-38 Folsom Ave., St. Louis 10, Mo.

EVAPORATOR PRESSURE CONTROLS

AMMONIA COMPRESSORS

Wolf Linde

Est 1880

FREON VALVES UP TO 12"

AMMONIA VALVES AND FITTINGS

Manufactured and Sold by

DERSCH, GESSWEIN & NEUERT, Inc.
4849 West Grand Avenue Chicago 39, Illinois

THE BUYERS

INDEX TO ADVERTISEMENTS OF THESE FIRMS—PAGE 80

CAN DUMPS (Continued)
Ohio Galvanizing & Mfg. Co., Niles, Ohio
Reynolds Mfg. Co., Springfield, Mo.
Vogt Machine Co., Henry, Louisville, Ky.

CAR ICING EQUIPMENT
Capital Elevator & Mfg. Co., Columbus, Ohio
Conveyor Co., The, Los Angeles, Calif.
Gifford-Wood Co., Hudson, N. Y.
Lilly Co., The, Memphis, Tenn.

COILS
Acme Industries, Inc., Jackson, Mich.
Byers Co., A. M., Pittsburgh, Pa.
Chicago Nipple Mfg. Co., Chicago, Ill.
Creamery Package Mfg. Co., Chicago, Ill.
Detroit Ice Machine Co., Detroit, Mich.
National Pipe Bending Co., New Haven, Conn.
Philadelphia Pipe Bending Co., Philadelphia, Pa.
Rempe Company, Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.

COLD STORAGE CONSTRUCTION
Armstrong Cork Co., Lancaster, Pa.
Frick Co., Waynesboro, Pa.

COLD STORAGE DOORS
Butcher Boy Cold Storage Door Co., Chicago, Ill.
Chase Cold Storage Door Co., Reading, Ohio
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Jamison Cold Stge. Door Co., Hagerstown, Md.

COMPRESSORS
(See Ice Making and Refrigerating Machinery)

COMPRESSOR VALVE PLATES AND DISCS
Voss, Inc., J. H. H., New York, N.Y.

COMPRESSOR VALVES
Voss, Inc., J. H. H., New York, N.Y.

CONDENSERS
Acme Industries, Inc., Jackson, Mich.
Creamery Package Mfg. Co., Chicago, Ill.
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Frick Co., Waynesboro, Pa.
Kehoe Machinery Co., Inc., R. P., Ridgefield Park, N. J.
King-Zeero Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Philadelphia Pipe Bending Co., Philadelphia, Pa.
Rempe Company, Chicago, Ill.
Reynolds Mfg. Co., Springfield, Mo.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.

CONSULTING ENGINEERS
Greene, Van R. H., New York, N. Y.
Ophuls & Associates, Fred, New York, N. Y.

CONTROLLNG INSTRUMENTS
Taylor Instrument Companies, Rochester, New York

CONVEYORS
Capital Elevator & Mfg. Co., Columbus, Ohio
Conveyor Co., The, Los Angeles, Calif.
Gifford-Wood Co., Hudson, N. Y.
Lilly Co., The, Memphis, Tenn.

COOLING TOWERS
Frick Co., Waynesboro, Pa.
Vilter Mfg. Co., Milwaukee, Wis.

CORK INSULATION
Armstrong Cork Co., Lancaster, Pa
Luse-Stevenson Co., Inc., Chicago, Ill.

CORROSION CONTROL
Wright Chemical Control Corp., Chicago, Ill.

COUPON BOOKS
Index Coupon & Supply Co., La Porte, Ind.
United Ice & Oil Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

COVERINGS (PIPE AND BOILERS)
American Hair & Felt Co., Chicago, Ill.
Armstrong Cork Co., Lancaster, Pa.

CYLINDERS (GAS & LIQUID)
Byers Co., A. M., Pittsburgh, Pa.

DEIONIZING EQUIPMENT
Industrial Filter & Pump Mfg. Co. Inc., Chicago, Ill.

DEMINERALIZING EQUIPMENT
Industrial Filter & Pump Mfg. Co. Inc., Chicago, Ill.

DIP TANKS AND CAN BASKETS
Frick Co., Waynesboro, Pa.
Ice Plant Equipment Co., Inc. Philadelphia, Pa.
Knickerbocker Stamping Co., Parkersburg, W. Va.
Ohio Galvanizing & Mfg. Co., Niles, Ohio
Vogt Machine Co., Henry, Louisville, Ky.

DRIVES, TRANSMISSIONS
Frick Company, Waynesboro, Pa.

ELEVATING & CONVEYING MACHINERY
Capital Elevator & Mfg. Co., Columbus, Ohio
Conveyor Co., The, Los Angeles, Calif.
Gifford-Wood Co., Hudson, N. Y.
Lilly Co., The, Memphis, Tenn.

ENGINEERS AND ARCHITECTS
(See Architects and Engineers)

EVAPORATIVE CONDENSERS
Niagara Blower Co., New York, N.Y.

EVAPORATORS
Acme Industries, Inc., Jackson, Mich.
Creamery Package Mfg. Co., Chicago, Ill.
Frick Co., Waynesboro, Pa.
Niagara Blower Co., New York, N.Y.
Rempe Company, Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.

FEED-WATER HEATERS
National Pipe Bending Co., New Haven, Conn.
Vogt Machine Co., Henry, Louisville, Ky.

FIBERGLAS
Armstrong Cork Co., Lancaster, Pa.

FIELD ICE SAWS
Gifford-Wood Co., Hudson, N. Y.
United Ice & Oil Supply Co., Boston, Mass.

FILTERS, CLARIFYING
Industrial Filter & Pump Mfg. Co., Inc., Chicago, Ill.

FILTERS, WATER
Frick Co., Waynesboro, Pa.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Industrial Filter & Pump Mfg. Co., Inc., Chicago, Ill.

FILTRATION EQUIPMENT
Industrial Filter & Pump Mfg. Co., Inc., Chicago, Ill.

FIN COILS
Acme Industries, Inc., Jackson, Mich.
Rempe Company, Chicago, Ill.

DIRECTORY

INDEX TO ADVERTISEMENTS OF THESE FIRMS—PAGE 80

FITTINGS
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Frick Co., Waynesboro, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

FLOAT VALVES
Mojonnier Bros. Co., Chicago, Ill.

FROZEN FOOD LOCKERS
Knickerbocker Stamping Co., Parkersburg, W. Va.

FUEL OIL PRE-HEATERS
National Pipe Bending Co., New Haven, Conn.
Rempe Company, Chicago, Ill.

HAND TRUCKS
Ohio Galvanizing & Mfg. Co., Niles, Ohio

HOISTING APPARATUS
Capital Elevator & Mfg. Co., Columbus, Ohio
Conveyor Co., The, Los Angeles, Calif.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Reynolds Mfg. Co., Springfield, Mo.

HUMIDITY AIR CONDITIONERS
Niagara Blower Co., New York, N.Y.

HYGROMETERS
Taylor Instrument Companies, Rochester, N. Y.

ICE BAGS
International Paper Co., New York, N. Y.
Union Bag & Paper Corp., New York, N. Y.

ICE BLOWERS
Conveyor Co., The, Los Angeles, Calif.
Gifford-Wood Co., Hudson, N. Y.

ICE CANS
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Kehoe Machinery Co., Inc., R. P., Ridgefield Park, N. J.
Knickerbocker Stamping Co., Parkersburg, W. Va.
Ohio Galvanizing & Mfg. Co., Niles, Ohio

ICE CAN FILLERS
Frick Co., Waynesboro, Pa.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Knickerbocker Stamping Co., Parkersburg, W. Va.
Ohio Galvanizing & Mfg. Co., Niles, Ohio
Vogt Machine Co., Henry, Louisville, Ky.

ICE CHIPPERS
Capital Elevator & Mfg. Co., Columbus, Ohio
Gifford-Wood Co., Hudson, N. Y.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Index Coupon & Supply Co., La Porte, Ind.
United Ice & Oil Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

ICE CHUTES
Conveyor Co., The, Los Angeles, Calif.
Frick Co., Waynesboro, Pa.
Gifford-Wood Co., Hudson, N. Y.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Jamison Cold Storage Door Co., Hagerstown, Md.

ICE CONVEYORS
Capital Elevator & Mfg. Co., Columbus, Ohio
Conveyor Co., The, Los Angeles, Calif.
Gifford-Wood Co., Hudson, N. Y.
Lilly Co., The, Memphis, Tenn.
United Ice & Oil Supply Co., Boston, Mass.

ICE CREAM PLANTS
Frick Co., Waynesboro, Pa.

ICE CRUSHERS
Bateman Foundry & Machine Co., Inc., Mineral Wells, Texas
Conveyor Co., The, Los Angeles, Calif.
Gifford-Wood Co., Hudson, N. Y.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Index Coupon & Supply Co., La Porte, Ind.
Kehoe Machinery Co., Inc., R. P., Ridgefield Park, N. J.
Lilly Co., The, Memphis, Tenn.
United Ice & Oil Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

ICE CUBE CONTAINERS
Index Coupon & Supply Co., La Porte, Ind.
International Paper Co., New York, N. Y.
Lilly Co., The, Memphis, Tenn.
Union Bag & Paper Co., New York, N. Y.
United Ice & Oil Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

ICE CUBERS
Vivian Mfg. Co., St. Louis, Mo.

ICE CUBING MACHINES
Gifford-Wood Co., Hudson, N. Y.
Ice Plant Equipment Co., Inc. Philadelphia, Pa.
Lilly Co., The, Memphis, Tenn.
United Ice & Oil Supply Co., Boston, Mass.

ICE DELIVERY BAGS
Gifford-Wood Co., Hudson, N. Y.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Index Coupon & Supply Co., La Porte, Ind.
International Paper Co., New York, N. Y.
Lilly Co., The, Memphis, Tenn.
Union Bag & Paper Corp., New York, N. Y.
United Ice & Oil Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

ICE HARVESTING MACHINERY & TOOLS
Gifford-Wood Co., Hudson, N. Y.
United Ice & Oil Supply Co., Boston, Mass.

ICE MAKING AND REFRIGERATING MACHINERY
Creamery Package Mfg. Co., Chicago, Ill.
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Detroit Ice Machine Co., Detroit, Mich.
Enterprise Equipment Corp., Yonkers, N. Y.
Frick Company, Waynesboro, Pa.
Ice Plant Equipment Co., Inc. Philadelphia, Pa.
Kehoe Machinery Co., Inc., R. P., Ridgefield Park, N. J.
Reynolds Mfg. Co., Springfield, Mo.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.

ICE PICKS
Conveyor Co., The, Los Angeles, Calif.

ICE PICKS AND PLANERS
Conveyor Co., The, Los Angeles, Calif.
Gifford-Wood Co., Hudson, N. Y.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Index Coupon & Supply Co., La Porte, Ind.
Lilly Co., The, Memphis, Tenn.
United Ice & Oil Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

(Buyers Directory continued on next page)

WEATHERPROOFED ICE SIGNAL CARDS

Coated Both Sides With Paraffine

ANY COLOR

ANY SIZE

We Make Any Design of Ice Signal Card

Send In Your Individually Designed Cards for Quotation

Write for Ice Signal Card Circular and Prices

Index Coupon & Supply Co.
LaPorte, Indiana

Your Assurance of Best Quality
REFRIGERATION COILS
made by The National
PIPE BENDING COMPANY

All features that you demand are furnished regularly in National Pipe Bending Refrigeration coils—smooth bends, perfect welds, measurements exact.

For long service specify coils by the National

Pipe Bending Co.
Established 1883
162 River St., New Haven, Conn.

SERVING THE ICE INDUSTRY FOR 20 YEARS

Dependable . . Automatic . . Refrigerated

S&S ICE VENDING STATIONS

AND ICE VENDING EQUIPMENT

Write, Phone or Wire for Full Details and Prices!

S&S Vending Machine Co.

670 LINCOLN AVE., SAN JOSE, CALIFORNIA

1101 N. HIGHLAND, ARLINGTON, VIRGINIA

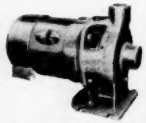
Small Capacity • Medium Duty

SIDE SUCTION PUMPS

Close-Coupled • **Flexible Coupling** • **Belt Drive**

CAPS 5 to 75 G.P.M. **HEADS** 0 to 100 ft.

Ideal as part of Equipment Manufacturer's product, such as, air conditioning units, cooling towers, evaporator coolers, milk coolers, hot water circulators, etc.—and general service. Speeds 1750 to 3500 R.P.M.



Type JMC Aurora Close-Coupled Pump

DISTRIBUTORS IN PRINCIPAL CITIES

AURORA Always PUMPS

AURORA PUMP COMPANY

78 Loucks St. Aurora, Illinois

THE BUYERS

INDEX TO ADVERTISEMENTS OF THESE FIRMS—PAGE 80

ICE PICK SCABBARDS
Gifford-Wood Co., Hudson, N. Y.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Index Coupon & Supply Co., La Porte, Ind.
United Ice & Oil Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

ICE PICK VENDING MACHINES
United Ice & Oil Supply Co., Boston, Mass.

ICE PLANTS
Enterprise Equipment Corp., Yonkers, N. Y.
Kehoe Machinery Co., Inc., R. P., Ridgefield Park, N. J.

ICE SCALES
Conveyor Co., The, Los Angeles, Calif.
Gifford-Wood Co., Hudson, N. Y.
Index Coupon & Supply Co., La Porte, Ind.
Lilly Co., The, Memphis, Tenn.
United Ice & Oil Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

ICE SHAVERS
Conveyor Co., The, Los Angeles, Calif.

ICE TOOLS
Conveyor Co., The, Los Angeles, Calif.
Gifford-Wood Co., Hudson, N. Y.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Index Coupon & Supply Co., La Porte, Ind.
Lilly Co., The, Memphis, Tenn.
United Ice & Oil Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

INDICATING INSTRUMENTS
Taylor Instrument Companies, Rochester, New York

ICE VENDORS
Frick Company, Waynesboro, Pa.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Jamison Cold Storage Door Co., Hagerstown, Md.
S & S Vending Machine Co., San Jose, Calif.
United Ice & Oil Supply Co., Boston, Mass.

INSTANTANEOUS HEATERS
National Pipe Bending Co., New Haven, Conn.

INSULATING MATERIALS
American Hair & Felt Co., Chicago, Ill.
Armstrong Cork Co., Lancaster, Pa.
Hogan & Co., Inc., C. T., New York, N. Y.
Luse-Stevenson Co., Inc., Chicago, Ill.
Pacific Lumber Co., San Francisco, Calif.

INSULATION ADHESIVES
American Bitumuls & Asphalt Co. San Francisco, Calif.

LOW TEMPERATURE EQUIPMENT
(See Ice Making and Refrigerating Machinery)

MAGNETIC FLOAT SWITCHES
Mojonnier Bros. Co., Chicago, Ill.

MATERIALS HANDLING EQUIPMENT
Conveyor Co., The, Los Angeles, Calif.
Ohio Galvanizing & Mfg. Co., Niles, Ohio

OIL AND LUBRICANTS
Socony-Vacuum Oil Co., Inc., New York, N. Y.
Sun Oil Co., Philadelphia, Pa.
Texas Co., The, New York, N. Y.

OIL SEPARATORS
King-Zeero Co., Chicago, Ill.
Rex Engineering & Sales Co., Oklahoma City, Okla.

OILS, CUTTING
Socony-Vacuum Oil Co., Inc., New York, N. Y.
Sun Oil Co., Philadelphia, Pa.
Texas Co., The, New York, N. Y.

OILS, FUEL
Socony-Vacuum Oil Co., Inc., New York, N. Y.
Sun Oil Co., Philadelphia, Pa.
Texas Co., The, New York, N. Y.

PACKINGS
Frick Company, Waynesboro, Pa.
Vivian Mfg. Co., St. Louis, Mo.

PIPE COILS AND BENDS
Acme Industries, Inc., Jackson, Mich.
Chicago Nipple Mfg. Co., Chicago, Ill.
Frick Company, Waynesboro, Pa.
Kehoe Machinery Co., Inc., R. P., Ridgefield Park, N. J.
National Pipe Bending Co., New Haven, Conn.
Philadelphia Pipe Bending Co., Philadelphia, Pa.
Rempe Company, Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.

PIPE WELDING
Acme Industries, Inc., Jackson, Mich.
National Pipe Bending Co., New Haven, Conn.
Philadelphia Pipe Bending Co., Philadelphia, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

PIPING
Acme Industries, Inc., Jackson, Mich.
Byers Co., A. M., Pittsburgh, Pa.
Frick Company, Waynesboro, Pa.
National Pipe Bending Co., New Haven, Conn.
Philadelphia Pipe Bending Co., Philadelphia, Pa.
Rempe Company, Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.

PRESSURE BLOWERS
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.

PRESSURE REGULATORS
Taylor Instrument Companies, Rochester, N. Y.

PROPELLERS
Ice Plant Equipment Co., Inc., Philadelphia, Pa.

PUMPING MACHINERY
Aurora Pump Co., Aurora, Ill.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Layne & Bowler, Inc., Memphis, Tenn.
Roots-Connersville Blower Corp., Connersville, Ind.

PUMPING MACHINERY—AIR LIFT
Roots-Connersville Blower Corp., Connersville, Ind.

PUMPS, AMMONIA AND BRINE
Frick Company, Waynesboro, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.
Vogt Machine Co., Henry, Louisville, Ky.

PUMPS, DEEP WELL
Aurora Pump Co., Aurora, Ill.
Layne & Bowler, Inc., Memphis, Tenn.

PUMPS, ROTARY
Aurora Pump Company, Aurora, Ill.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.

DIRECTORY

INDEX TO ADVERTISEMENTS OF THESE FIRMS—PAGE 80

PURGERS
Armstrong Machine Works, Three Rivers, Mich.
Frick Company, Waynesboro, Pa.
Rex Engineering & Sales Co., Oklahoma City, Okla.

RAW WATER FREEZING SYSTEMS
Frick Co., Waynesboro, Pa.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

REBOILERS
Frick Company, Waynesboro, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

RECORDING THERMOMETERS
Taylor Instrument Companies, Rochester, New York

REFRIGERATED ICE STATIONS
S & S Vending Machine Co., San Jose, Calif.

REFRIGERATING AND ICE MAKING MACHINERY
(See Ice Making and Refrigerating Machinery)

RUST PREVENTATIVES
Bower Chemical Mfg. Co., Henry Philadelphia, Pa.

SCORING MACHINES
Frick Company, Waynesboro, Pa.
Gifford-Wood Co., Hudson, N. Y.
Lilly Co., The, Memphis, Tenn.
Perfection Ice Scoring Machine Co., Fort Worth, Texas
United Ice & Oil Supply Co., Boston, Mass.

SECOND HAND MACHINERY
Enterprise Equipment Corp., Yonkers, N. Y.
Kehoe Machinery Co., Inc., R. P., Ridgefield Park, N. J.
United Ice & Oil Supply Co., Boston, Mass.

SEPARATORS OIL, STEAM AND AMMONIA
Acme Industries, Inc., Jackson, Mich.
Frick Company, Waynesboro, Pa.
King-Zeero Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.

SHOULDER PADS
Gifford-Wood Co., Hudson, N. Y.
Index Coupon & Supply Co., La Porte, Ind.
Lilly Co., The, Memphis, Tenn.
United Ice & Oil Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

SIZED ICE EQUIPMENT
Bateman Foundry & Machine Co., Inc., Mineral Wells, Texas
Gifford-Wood Co., Hudson, N. Y.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Lilly Co., The, Memphis, Tenn.
Vivian Mfg. Co., St. Louis, Mo.

SPRAY NOZZLES
Ice Plant Equipment Co., Inc., Philadelphia, Pa.

STORAGE HEATERS
National Pipe Bending Co., New Haven, Conn.

STRAINERS
Ice Plant Equipment Co., Inc., Philadelphia, Pa.

TANKS
Frick Company, Waynesboro, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

TAPE, INSULATING
Hogan & Co., Inc., C. T., New York, N. Y.

TARPAULINS
Ice Plant Equipment Co., Inc. Philadelphia, Pa.
Index Coupon & Supply Co., La Porte, Ind.
Lilly Co., The, Memphis, Tenn.
United Ice & Oil Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

THERMOMETERS
Ice Plant Equipment Co., Inc. Philadelphia, Pa.
Taylor Instrument Companies, Rochester, New York

THERMOMETERS, RECORDING
Taylor Instrument Companies, Rochester, New York

TIERING MACHINES
Capital Elevator & Mfg. Co., The, Columbus, Ohio
Gifford-Wood Co., Hudson, N. Y.

TRAPS, OIL & STEAM
Armstrong Machine Works, Three Rivers, Mich.
Rex Engineering & Sales Co., Oklahoma City, Okla.

UNIT COOLERS
Acme Industries, Inc., Jackson, Mich.
Niagara Blower Co., New York, N.Y.
Rempe Company, Chicago, Ill.

USED MACHINERY
Enterprise Equipment Corp., Yonkers, N. Y.
Kehoe Machinery Co., Inc., R. P., Ridgefield Park, N. J.

VALVES AND FITTINGS
Alco Valve Co., St. Louis, Mo.
Frick Company, Waynesboro, Pa.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Kehoe Machinery Co., Inc., R. P., Ridgefield Park, N. J.
Phillips & Co., H. A., Chicago, Ill.
Shank Co., Cyrus, Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.

VALVES, COMPRESSOR
Voss, Inc., J. H. H., New York, N.Y.

WATER COOLERS
Acme Industries, Inc., Jackson, Mich.
Niagara Blower Co., New York, N.Y.
Vogt Machine Co., Henry, Louisville, Ky.

WATER TREATMENT MATERIALS
Industrial Filter & Pump Mfg. Co. Inc., Chicago, Ill.

WELDING
Frick Company, Waynesboro, Pa.
Philadelphia Pipe Bending Co., Philadelphia, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

WELL SCREENS
Layne & Bowler, Inc., Memphis, Tenn.

WROUGHT IRON PIPE
Byers Co., A. M., Pittsburgh, Pa.

FRED OPHULS & ASSOCIATES,
Consulting Engineers
112-114 WEST 42nd ST. NEW YORK CITY 18
Ice Making and Refrigeration - Industrial Power Plants Reports, Appraisals and Management

VAN RENSSELAER H. GREENE
ENGINEERS
COMPLETE PLANT DESIGNS INCLUDING BUILDING AND EQUIPMENT
11 PARK PLACE **NEW YORK 7, N.Y.**

Save Refrigeration Costs With THE BEST DOORS MADE

Every style of door and cooler:—reach-in, walk-in, track, vestibule, wicket, can passing — all top quality. Lowest cost use and maintenance. Write for **FREE** estimates.

Chase **COLD STORAGE DOOR COMPANY**
Div. of Chase Industrial Refrigerator Equipment & Engineering Co.
DEPT. 25 **READING 15, OHIO**

NOZZLES • DROP TUBES • CAN DOGS • CAN FILLERS • BLOWERS • BRACKETS • BAGS • HOISTS
• ICE CRUSHERS •
CLEAR RAW WATER AIR AGITATION SYSTEMS
REPLACEMENT PARTS — ICE CRUSHING EQUIPMENT
ICE SIZING EQUIPMENT — ICE DELIVERY EQUIPMENT
ICE HANDLING EQUIPMENT
PROMPT DELIVERIES — LOW PRICES
ICE PLANT EQUIPMENT CO., Inc.
WRITE OR TELEGRAPH **2543 Frankford Ave.** **Philadelphia 25, Pa.** **TELEPHONE NEbraska 4-3055**
• RUBBER TUBING •
TUBE CLEANERS • PUMPS • FILTERS • VALVES • ICE TONGS • THERMOMETERS • ICE PICKS

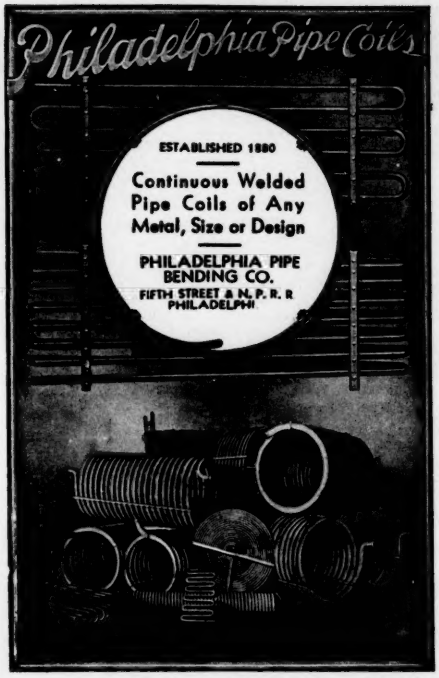
You'll always need WATER

HOW ABOUT a system of your own?

A Layne built well water supply will produce great quantities of water at a remarkably low cost. Furthermore, with a Layne system of your own, you need no longer depend on a source of supply that is too costly, inadequate or unsatisfactory. These systems are famous for their high efficiency and extra long life. Thousands have been installed for all types of industry, municipalities and farms using irrigation. Layne does the job complete; drills the wells, furnishes and sets casing, sand screen and pumps. Why not consider a system of your own? For further information, catalogs etc., address

LAYNE & BOWLER, INC.
General Offices, Memphis 8, Tenn.

Layne **WATER SUPPLY WELLS & PUMPS**


Philadelphia Pipe Coils
ESTABLISHED 1880
Continuous Welded Pipe Coils of Any Metal, Size or Design
PHILADELPHIA PIPE BENDING CO.
FIFTH STREET & N. P. R. R.
PHILADELPHI

USED ICE MACHINES AND EQUIPMENT

All Used Equipment Is Reconditioned In Our Modern Machine Shop

THIS IS ONLY A PARTIAL LIST-WRITE ABOUT ANY REQUIREMENTS WHICH YOU HAVE WE ARE BUYING ADDITIONAL EQUIPMENT ALL OF THE TIME

Compressors With or Without Motors

Item No.

1—4x4 York, 300 RPM 16
6—6x6 York's, 200 RPM 20
1—6x6 Frick, 257 RPM 21
2—6x6 York's, 400 RPM, forced-feed lubrication 25
2—6½x6½ Arctics, 350 RPM, forced feed lub. 30
1—7¼x7¼ Baker, 350 RPM, forced feed lubrication 35
1—7x7 Frick, 200 RPM 40
1—7½x7½ York, 200 RPM 51
2—7½x7½ Yorks, 350 RPM, forced-feed lubrication 54
1—7½x7½ York, 400 RPM, forced-feed lub. Late Type 55
1—8x8 Frick, 400 RPM forced feed lub. V-belt wheel 57
1—8x8 York, 400 RPM, forced feed lub., V-belt wheel 58
1—9x9 Arctic, 300 RPM, forced feed lub. 62
1—9x9 York, 200 RPM 71
1—9x9 Worthington, 325 RPM, forced feed lub. 72
1—10x10 De La Vergne, 360 RPM, forced feed lub. 73
1—10x10 York, 257 RPM, forced feed lub. 80

Item No.

1—10x10 Carbondale, 100 HP synch. motor, 350 RPM 81
3—10x10 York's, 225 RPM, semi-forced feed lub. 82
1—10x10 Frick, direct connected 100 HP Sync. Motor 84
1—10x10 York, direct connected 100 HP Sync. Motor 86
1—11x13 York, 164 RPM, forced feed lub. 90
2—12x12 Frick, direct conn. 150 HP synch. motor 98

Diesel Driven and Diesel Engines

1—8x8 York—Direct connected to 50 HP Fairbanks-Morse at 257 RPM 210

Steam Driven

1—8x8 Vertical York, 300 RPM direct connected 327

Pipe

10,000 feet wrought Iron pipe—2"—like new 451

Complete Ice Plants

1—15-ton electric driven plant 630
6—50-Ton Ice Plants, 10 can pull complete 631
Brand New 8 to 10-ton Clear Ice-Making Plants—110 Cans—Electric or Diesel Drive—2 Can Pull 632

Item No.

1—247 *Can, 22-ton ice plants, like new* 632A
1—35-38 ton New Clear Ice Making Plants 635
1—150 Ton Multi lift—1622 Can Plant 636
1—702 Can Plant—9 Can Pull 637
1—920 Can Plant—12 Can Pull 638
1—150 Ton Ice Plant—2 Tank 660

Traveling Cranes

2—4 Ton Overhead Traveling Cranes. 0 & 12 Can Grid.

Self-Contained Units

3—4x4 York & Fricks 742
1—5x5 York—390 RPM 743
1—4½x5 Lipman—360 RPM 744
1—3x3 Worthington 748
1—5x5 Frick—Forced Feed—400 RPM Latest Type 758

Used Ice Cubers

1—300 lb. ULINE, fully automatic cuber 501
1—50 lb. F & E Safety Cuber 502

Condensers

3—100 ton shell and tube condensers retubed 919
1—125-ton, Vertical Shell & Tube, 196 2" tubes 921
1—120 ton, 216—2" retubed Vertical Shell & Tube 922
2—20 ton Horizontal—retubed 924

Ice Cans

4000 Cans—Like new—11"x22"x47" 950

ROBERT P. KEHOE MACHINERY CO., Inc.

REFRIGERATION EQUIPMENT

6 EUCKER STREET
RIDGEFIELD PARK, N. J.

PHONE: DIAMOND 2-8554
CABLE ADDRESS: KEHOEINC

Classified Advertising

All classified advertisements are payable in advance. Except for Positions and Help Wanted classifications, this section is reserved exclusively for USED equipment.

RATES: $3.50 for 50 words or less; 10c for each additional 10 words or fraction thereof; 75c per line for bold face headings; $8.00 per inch for line listings.

POSITIONS AND HELP WANTED

POSITION WANTED—Warehouse executive, interested in relocating. Over twenty years experience in all phases refrigerated and general merchandise warehousing. Presently employed as general manager of medium sized operation. Excellent references. Address Box JU-7, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

POSITION WANTED—as chief engineer of a group of ice or cold storage plants, with large reputable firm. Qualified to handle all details or any condition that may arise; plant economy, maintenance, insulating, erecting, breakdowns, etc. Any size or number of plants. Member N.A.P.R.E. Best references. Address Box No. OT-5, Ice and Refrigeration, 435 N. Waller Av., Chicago 44, Ill.

ICE PLANTS—for sale

FOR SALE—10 ton ice plant, feed store and coal yard. Fairbanks Diesel powered with Howe compressor. Now in operation. Capacity 65 tons. Large farming and industrial area. Growing feed and coal business in town of 4,000 population. Write Rockport Milling Co., Rockport, Indiana.

FOR SALE—25 ton ice plant in combination with 800 frozen food lockers, housed in brick and concrete block building. In Southern state. Equipment modern and in excellent condition. Will sacrifice at half price due to illness. Address Box NV-8, Ice and Refrigeration, 435 N. Waller Ave., Chicago.

FOR SALE—Complete 40 ton Frick ice plant, 2 freezing tanks, 5 compressors, automatic controls, deep well pumps, crushing and sizing equipment, automatic bender, all in excellent condition. Must be moved. Would consider exchanging machinery for some cash and stock in new corporation locating equipment in good territory. Address Box OT-3, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44.

USED EQUIPMENT-wanted & for sale

FOR SALE—ICE CANS. Large quantity, 11"x 22"x47" and 51"; 14 gauge, galvanized. Excellent condition. Price $2.50 each. Address Box NV-14, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

FOR SALE—Two good Bruce MacBeth 100 h.p. gas engines complete with generators, exciters and switchboard controls. Also good 7½x7½ York Y15 compressor. New sleeves, valves, 40 h.p. motor, V belts. Diamond Ice Company, Purcell, Okla.

FOR SALE

2—York 8x8 used, good condition, $1250.00 each.
1—Vertical shell & tube ammonia condenser 16' long, 115 tubes; like new, $950.00.
1—Frick No. 90 galvanized instant water cooler—new, in factory crate, 65 gpm., $1200.00.
2—40 h.p. Century motors, 865 r.p.m., $350.00 ea.
Prices F.O.B. Miami, subject to prior sale.

DADE REFRIGERATING CO., INC.
1798 N.W. 20th St. Miami 42, Fla.

FOR SALE—Evaporator coil—50 ton new, built by Crane Co. Flooded type; immediate delivery. Write for description or photo and measurements; also compressors 2x2 to 8x8; valves, all types, cork insulation, board and granulated. Electrical Repair Co., 210 Prescott St., St. Paul 7, Minn.

WANTED—Used ice plants, 5 to 100 tons. Also NH₃ highsides. Only recent manufacture. Must be priced F.O.B. RR cars. Give detailed description, no generalities. For Resale. We pay fair prices and inspect personally. Write Box OT-4, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

FOR SALE—Equipment and refrigeration for 20 ton ice plant, motor or Diesel driven. 110 h.p. Buckeye, 65 h.p. Superior. Also brine cooler, brine pump, headers and all piping, except floor coils, for ice skating surface 80'x180', and necessary resurfacing equipment. Contact Gibson Ice Co., 2600 S. Mock Ave., Muncie, Ind.

FOR SALE

Perfection "Special" scoring machine (scores and upends).
Type F Gifford-Wood scoring machine—2 years old.
Gifford-Wood 3 screen, 4 bin, ice sizing unit.
7½ h.p. Hoffman low pressure blower.
Two 5 h.p. agitators—used one year.

JOHN F. CARSON
2829 N. Broad St. Philadelphia 32, Pa.
Phone: BAldwin 9-8549

FOR SALE

1—5½x5½ Baker unit with 20 h.p. motor $650.00
1—4½x4½ Baker unit with 10 h.p. motor $550.00

MACK REFRIGERATION EQUIPMENT
210 Midland Ave. Kearney, N. J.

FOR SALE—Several sizes of ammonia and Freon compressors, ice plants, coils, brine coolers, condensers, receivers, oil traps, agitators, Diesel engines. Write us your requirements. Parke Pettegrew & Son Company, 370 West Broad St., Columbus 8, Ohio.

FOR SALE—9x9, 8x8, 6x6, 5x5, 4x4 Yorks and 4x4, 5x5 Frick compressors, all splash lubrication. One 10 ton shell & tube brine cooler, float control. Ammonia receivers, all sizes. One 10 ton Frick Freon condensing unit. 4 Acme Freon blower units. One 3 ton Niagara ammonia blower unit. Write E. Nebbing, 1546 St. Clair Ave., Mount Healthy, Cincinnati 31, Ohio.

FOR SALE—2 completely rebuilt 7x7 and 9x9 Frick compressors, high speed FF lubrication, with 40 and 75 slip ring motors and auto reduced voltage starters. 36"x15' vertical condenser, 140—2" tubes, 30"x16' vertical condenser 96—2" tubes—both retubed since used. 39"x16'0" horizontal 10 pass condenser 176—2" tubes and 46"x15'10 pass 220—2" tubes, both excellent condition. Also one 30"x16'0" receiver. Address Box OT-8, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

FOR SALE

1—150 ton York ice plant, electric driven, 13 can pull, 10 yrs. old—equal to new.
1—65 ton Frick ice plant, Diesel driven, 27 can pull.
1—50 ton York ice plant, electric driven, 4 can pull (overhauled and new compressors installed 1947).
1—10x10 York ammonia compressor connected by coupling to 100 h.p., 300 r.p.m. GE synchronous motor.
1—8x8 York ammonia compressor direct connected to 50 h.p. synchronous motor.
1—7½x7½ York ammonia compressor direct connected to 40 h.p. synchronous motor. Cubing machines, scoring machines, agitators, water and brine pumps, etc.

JOHN F. CARSON
2829 N. Broad St. Philadelphia 32, Pa.
BAldwin 9-5932

FOR SALE—1 Fairbanks-Morse 75 h.p. "Y" type Diesel engine. In excellent condition; must be moved. Priced to sell. Can be seen in operation at Harman Ice & Coal Co., 724 W. Walnut St., Johnson City, Tenn.

FOR SALE—200 standard 300# used cans, serviceable condition. One 100 h.p. Fairbanks-Morse "Y" type engine, perfect running condition. One practically new 8½x8½ Vilter ammonia compressor with fly wheel for belt drive. One 25 KW Fairbanks-Morse 220 volt, 3 phase, 60 cycle AC current generator complete with exciter, belt driven. One absolutely new Dayton-Dowd centrifugal pump with 3" suction, 2" discharge, direct connected to electric motor. 1 low pressure Pottstown belted blower for 200 can tank. Write Jos. H. Morris, PO Box 41, Jackson, Miss.

FOR SALE—STEAM MACHINERY
Top Shape—Operating

VOGT 266 h.p. 4 drum welded bent tube boiler suspended tile setting, forced draft, complete.
CHUSE poppet valve uniflow engine 22x28 w/DeLaVergne 150 T ammonia compressor 18x18, new Voss valves.
UNION duplex pumps, 12x12x12; 7½x5x6; 12x10x18, all with bronze liners and stainless steel rods. Ammonia generator and absorber.

WICHITA ICE & COLD STORAGE CO.
213 S. Rock Island Ave. Wichita 2, Kans.

FOR SALE—ICE PLANTS & EQUIPMENT

10, 15, 20, 30, 50 ton ice plants.
2—10x10 York ammonia compressors.
1—9x9 York ammonia compressor direct connected to a 75 h.p. synchronous motor.
1—9x9 York ammonia compressor 200 r.p.m.
1—8x8 York ammonia compressor 360 r.p.m.
1—7½x7½ York ammonia compressor with 40 h.p. 3/60/220 motor.
1—6½x6½ York ammonia compressor with capacity control valves.
1—6½x6½ York ammonia compressor 200 r.p.m.
1—5x5 Frick ammonia compressor 277 r.p.m.
1—4x4 York ammonia compressor 400 r.p.m.
1—4x4 York self-contained unit.
2—3x3 York self-contained units.
1000 ice cans, various sizes.
Motors and starters for all compressors.
Condensers, brine coolers, cranes, can dumps, can fillers, valves and fittings. Send us your requirements on any equipment that you may need.

B & E REFRIGERATING CO.
2 Orange St., Newark 2, N. J.
Phone MItchell 3-7790 Cable Address "BERECO"

COLD STORAGE EQUIPMENT

Frick 30"x16'0", 100 ton, 80 tube vertical single pass condenser. Excellent condition, $450.00. Good ammonia valves, both screw and flange types, ½" to 6", at bargains.

SAFEWAY LOCKERS

$25.00 per 5 locker stand (drawer type); $10.00 per 2 locker stand (door type). Lots of other good equipment. Tell us what you need.

AAA STEEL, MCHY. & SUPPLY CO.
Canton & Hawkins Sts. Dallas 1, Texas

FOR SALE—USED EQUIPMENT

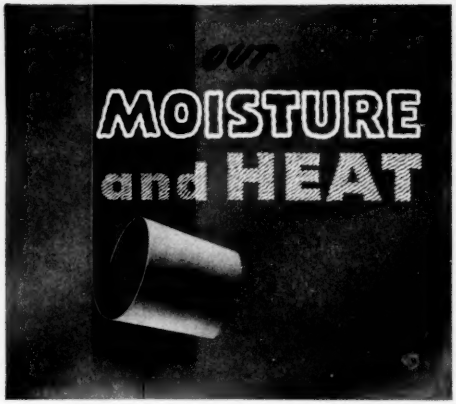
1—35 ton York low pressure, electric drive, synchronous motor driven, 4 can lift, well pumps vertical shell & tube condenser, piping, panels complete.
3—100 ton York and Frick ice plants.
1—50 ton York ice plant.
1—70 ton Vilter ice plant.
1—200 ton York ice plant.
1—120 ton York ice plant.
1—400 ton York ice plant.
2—300# Champion ice crushers with 7½ h.p. motors, with hoppers and chutes.
1—Model F Gifford-Wood 2 way scoring machine.
1—Perfection 2 way scoring machine.
3—Tiering machines, 4-6-8 Tiers.
1—Gifford-Wood Model #560 Ice Crusher, in original crate.
1—90 ton horizontal shell and tube condenser.
500—11"x22"x47" ice cans, good condition.
500—11"x22"x50" ice cans, good condition, LIKE NEW.
1—4x4 York self-contained unit, 5 h.p.
102—Door type Master lockers, 15"x24"x30".
102—Drawer type Master lockers, 16"x24"x30".
1—Model 54-Y Creasey ice crusher, belt drive.
Conveyor chain—6" pitch.
Send us your requirements on equipment you need.

UNITED SUPPLY & EQUIPMENT CO., INC.
55 Beverly Street Boston 14, Mass.

FOR SALE
ICE PLANTS & EQUIPMENT

30-50-60-100 Ton Ice Plants—Immediate sale.
Ice Cans—11x22x47"—Good Condition
Ice Cans—11x22x51"—Excellent Condition
1—Frick 12x12" Ammonia Compressor direct connected to Deisel Engine—can be purchased without diesel.
1—York 10x10" Ammonia Compressor direct connected to synchronous motor 3/60/440 Speed 300
1—York 10x10" Ammonia Compressor direct connected to 60 HP synchronous motor 200 R.P.M.
1—York 10x10" Ammonia Compressor direct connected to 100 HP synchronous motor 200 R.P.M.
1—York 10x10" Ammonia Compressor 200 R.P.M.
1—York 10x10" Ammonia Compressor High Speed.
Parts for York 10x10" Cylinder Block, Top Heads, Pistons and connecting rod.
1—York 8x8" Ammonia Compressor direct connected to 60 HP synchronous motor 360 R.P.M.
1—York 8x8" Ammonia Compressor High Speed.
1—York 6x6" Ammonia Compressor High Speed.
1—Voss 6x6" Ammonia Compressor Medium Speed.
1—York 5x5" Ammonia Compressor High Speed.
1—Frick 3x3" Ammonia Compressor High Speed.
Can supply motors for all compressors.
Low pressure blowers—all sizes.
Assorted sizes electric hoists and cranes ranging from 2 to 6 Ton capacity.
2—Gifford & Wood Tiering Machines, 5-tiers.
1—Scoring Machine Perfection.
2—Sheppard Cranes 4 and 5 Ton capacities—3 motor jobs.
Brine coolers, submerged shell and tube type.
1¼" and 2" Ammonia Coils, approximately 10,000 feet.
Send Us Your Requirements on Any Equipment You May Need.

ENTERPRISE EQUIPMENT CORPORATION
77-79 Alexander Street Yonkers, New York
Cable: Address: ENEQCO
Phone: Yonkers 8-8118-9



WITH

ALUMISEAL

U. S. Pat. App. For — Reg. U. S. Trade Mark

INSULATION

Vapor-Proof Lead-Faced Tape at Joints

Positively Seals Out Moisture!

Alumiseal is unique *double duty* insulation. A combination of solid aluminum alloy sheets that reflect and defy heat with joints sealed tight as a drum by *lead-faced vapor-proof tape* that defies moisture. Nothing else equals Alumiseal. Its *clean, sanitary finish* is rust proof, rot proof, vermin proof, fire safe. No deterioration, no costly replacement, no maintenance, no painting.

Alumiseal is ideal for freezers, coolers, bakery proof rooms, fermentation rooms, hardening rooms, banana ripening rooms, bulk storages—used extensively in all-weather test rooms and altitude chambers where temperatures range from minus 100°F. to plus 200°F. —any refrigerated or controlled humidity structures.

TYPICAL ORGANIZATIONS USING ALUMISEAL

A & P Bakery Division
Bakeries, Inc. (Sub. of Stop & Shop)
Best Foods, Inc.
Bickford's, Inc.
Breakstone Bros., Inc.
Brockton Coop. Egg Auction Assn., Inc.
Cushman's Sons, Inc.
Detroit Creamery Company
First National Stores
Food Fair Stores, Inc.
General Electric Company
General Foods Corporation
Chas. D. Glennie, Inc.
General Motors Research Lab.
Hathaway Bakeries
Hot Shoppes, Inc.
Kraft Foods Company
Kroger Company
Land O'Lakes Creameries, Inc.
Muller Dairies, Inc.
National Biscuit Company
National Dairy Products Corp.
National Tea Company
Reick-McJunkin Dairy Company
Sheffield Farms Company, Inc.
Southern Dairies, Inc.
Standard Brands, Inc.
Tom Boy Stores, Inc.
University of Vermont Dairy Bldg.
Ward Baking Company

Write us today for information on how ALUMISEAL can solve your insulating problem.

C. T. HOGAN & CO., INC.

383 MADISON AVE., NEW YORK 17, N. Y.

Over a Decade of Experience in Reflective Insulation

ADVERTISERS INDEX

Refer to Page 73 for Index Classified by Products

Acme Industries Inc. 63
Armour & Co. 67
Armstrong Cork Co. ..... Inside Back Cover
Aurora Pump Co. 76

Bateman Foundry Machine Co., Inc. 67
Byers Co., A. M. 2

Capital Elevator & Mfg. Co. 71
Chase Cold Storage Door Co. 77
Chicago Nipple Mfg. Co. 66
Classified Advertising 79
Classified Trade Index ..... 73, 74, 75, 76 and 77
Conveyor Co., The 9
Creamery Package Mfg. Co. 72

Dersh, Gesswein & Neuert, Inc. 74
Detroit Ice Machine Co. 71

Enterprise Equipment Corp. 79

Frick Co. 6

Gifford-Wood Co. 12
Greene, Van, R. H. 77

Hogan & Co., Inc., C. T. 80

Ice Plant Equipment Co., Inc. 77
Index Coupon and Supply Co. ..... 71 and 75
Industrial Filter and Pump Mfg. Co., Inc. 70
International Paper Co. 10

Jamison Cold Storage Door Co. ..... Back Cover

Kehoe Machinery Company, Inc., Robert P. 78

Layne & Bowler, Inc. 78
Luse-Stevenson Co., Inc. 66

National Pipe Bending Co., The 75
Niagara Blower Co. 63
Nickerson & Collins Co. 8

Ohio Galvanizing & Mfg. Co., The 65
Ophuls & Associates, Fred 77

Perfection Ice Scoring Machine Co. 73
Philadelphia Pipe Bending Co. 78
Phillips & Co., H. A. 67

Rempe Co. 71
Reynolds Manufacturing Co. 65
Roots-Connersville Blower Corp. 71

S & S Vending Machine Co. 76
Shank Co., Cyrus 73
Sun Oil Co. 5

Taylor Instrument Companies 1
Texas Co., The ..... Inside Front Cover

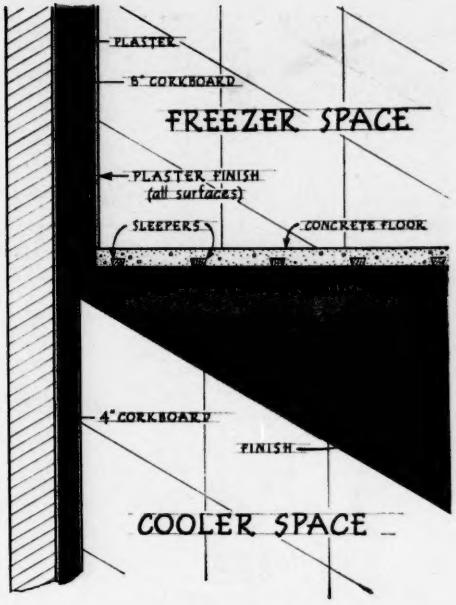
Union Bag & Paper Corporation 7

Vivian Mfg. Co. 74
Vogt Machine Co., Inc., Henry 4
Voss Co., Inc., J. H. H. 69

Wanted and For Sale Advertising 79

We have been asked:

"Why should freezer storage space be located over cooler space?"



"We plan to build a new warehouse containing both freezers and coolers," writes a wholesale food distributor. "We understand that freezer space should be built above rather than below cooler space. Is this correct? Please illustrate a good method for installing insulation in these rooms. The building will be of curtain wall construction."

To answer this question, we made the recommendation illustrated at right. Notice that the freezer is located *above* the cooler. This is sound practice whenever these areas are built one above the other. There are good reasons for this placement. If the cooler were built above the freezer, its floor might become so cold for a foot or more above the concrete floor that food placed on it for above-freezing storage would freeze and spoil. Another factor is economy. When freezers are on upper floors in multiple storage buildings, the tendency of cold air to settle makes it less expensive to refrigerate the higher temperature coolers below.

The insulation on the freezer walls is two layers of Armstrong's Corkboard, each 4" thick. Cooler insulation consists of two layers of corkboard, each 2" thick. All corkboard is applied in hot asphalt after the wall has been leveled with back plaster and primed with asphaltic paint.

The ceiling of the cooler is insulated with two layers of 3" Armstrong's Corkboard, with the first layer applied in hot asphalt and nailed to treated beveled wood strips placed on 18" centers in the forms when the floor was poured. The second layer then is applied in hot asphalt and additionally secured to it with oak skewers.

Helping you find the right answers to your various insulating problems is just one of the services of Armstrong's Contracting Organization. We can also supply you with top-quality insulating materials and the skilled workmen to apply them properly. Whenever you have an insulation job, it pays to contact Armstrong. The *complete* insulation service offered by Armstrong will save you time, money, and material.

SEND US YOUR QUESTIONS. If you have any questions on the use of insulation or the construction of low-temperature installations, we'll do our best to help you with a practical answer to your particular problem. Just outline your problem on a post card or letter and address it to Armstrong Cork Company, 4511 Concord Street, Lancaster, Pennsylvania.

ARMSTRONG'S INDUSTRIAL INSULATIONS

JAMISON Series

la
the B
can h
moving
ated spa

These 3
in use a
portray spa
metal kick
bar. Here's
trouble-free
Cold Stora
Md., U.S.

THERE'S A ***JAMISON*** *DOOR TO BEST FILL YOUR SPECIFIC NEEDS*

JAMISON

HAGERSTOWN, MARYLAND U. S. A.